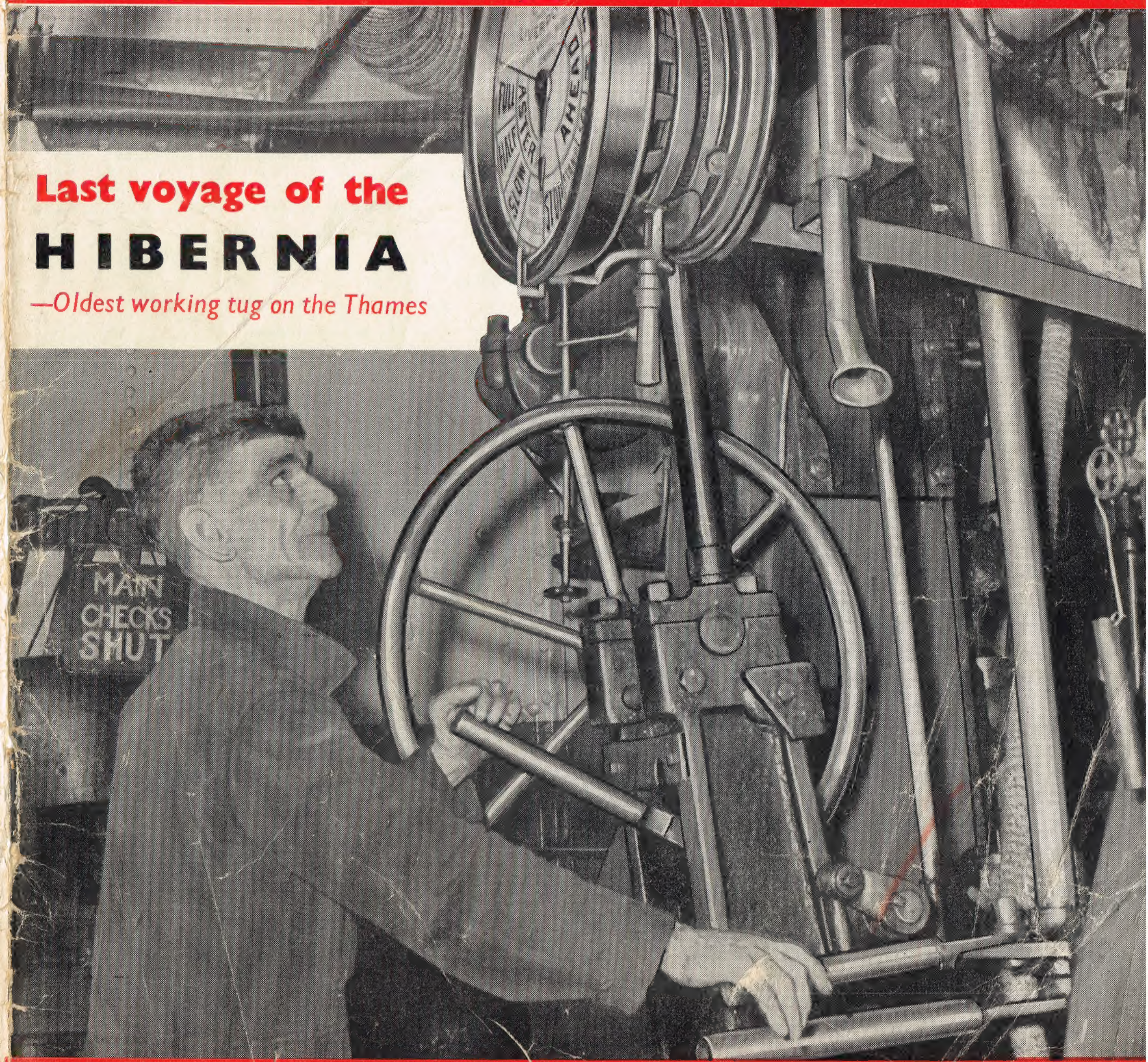
Model Engineer

THE MAGAZINE FOR THE MECHANICALLY MINDED



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HIBERNIA

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ONE SHILLING 29 JUNE 1961 VOL 124 NO 3129

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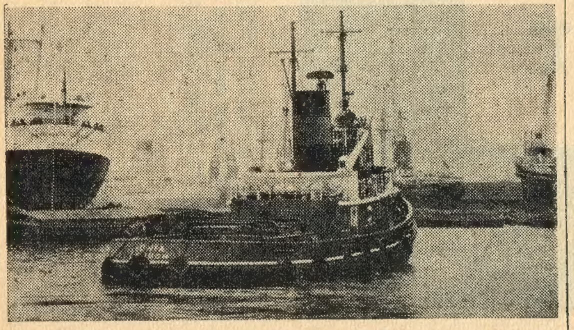

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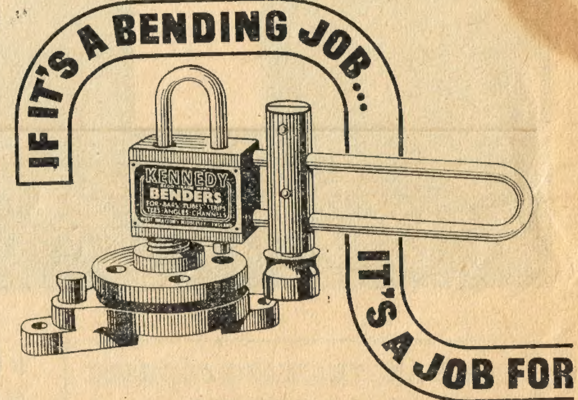

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IN THIS ISSUE

COVER PICTURE

The engine-room telegraph points significantly to STOP. A picture taken a short while before Hibernia, then the oldest ship towing tug on the Thames, made its journey to the breakers' yard. Oliver Smith writes the astonishing history of this wonderful old vessel on pages 795 to 797.

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A WEEKLY COMMENTARY

Smoke Rings

By VULCAN

SOME of our younger readers who hope to blossom into model locomotive builders when the opportunity arises are putting in some ground work by spending their free moments locospotting.

With steam locomotives disappearing at an alarming rate, lineside train watching can lay in a store of rich information for future use. Who knows that another J.N.M. may not at this moment be leaning over the Hadley Woods fence watching the trains go by?

Yet there can sometimes be other practical issues, a fact which has been brought to our notice by Mr J. Dobson, who is a keen train spotter.

Something wrong

When the 4.35 p.m. parcels train, bound for Kensington, pulled out of Plymouth it was making an alarming noise. He immediately got in touch with the station master at Plymouth.

Almost by return of post he received an appreciative letter from Mr F. G. Dean, District Traffic Superintendent at Plymouth for British Railways, Western Region, explaining that the noise was due to a "flat" worn on one wheel of a passenger vehicle. The vehicle had been taken out of passenger service and was being returned to Swindon for repair.

The superintendent could well appreciate, he said, that Mr Dobson felt there was something wrong with the train, which under other circumstances might have been the case, and he was very grateful to Mr Dobson for his prompt action.

Live wire

I can remember a parallel incident when I was a young lad with an absorbing interest in trams. In Hertford Road, Edmonton, where an overhead cable supplied current for the Metropolitan trams and some LCC cars which operated over the Edmonton and Waltham Cross routes, I noticed that the live wire had come loose from one anchorage and was swinging dangerously low.

I immediately telephoned the depot and within minutes a breakdown gang had arrived and secured the cable. The authorities were very appreciative.

Technical training

MR FRANK PERKINS, founder and chairman of a well-known British diesel manufacturing firm, recently opened a new motor vehicle workshop at Peterborough College, which is now being used by 240 students attending day and evening classes each week. Much of the equipment of the workshop has been presented by Perkins Company; it includes four lathes, a shaping machine and servicing instruments for fuel pumps and nozzles, functional analysis steering gear and equipment for headlight adjustment and testing.

The lack of adequate and up-to-date facilities has often restricted the scope of technical schools and training establishments in the past, and there is a rapidly growing demand for more and better workshop equipment to enable more students to be properly trained.

It is encouraging to note that these needs are recognised by progressive industrial concerns, and that some are prepared to give practical assistance to local educational authorities.

Electric take-over

SO the Golden Arrow, reckoned by many to be the most famous train in Britain, has been steam-hauled for the last time. Electric locomotives took over this month.

Though the general comments of passengers and railway staff were favourable—nearly all praised the smooth ride and excellent timing of the first electric takeover—there were a few nostalgic observations at the passing of steam from yet another famous train.

Robin Orchard will write a brief history of the Arrow, as it is familiarly dubbed, in an early issue.

The 4-4-0s

In the same context of vanishing steam engines, it is sad to observe that 4-4-0s will soon be gone from the Eastern Region.

Sir Nigel Gresley's Hunt class, built for the London and North Eastern Railway in 1928, has become extinct with the scrapping of No 62747 *The*

Percy. At the moment a few representatives of the Shire class remain.

The Shire class was introduced in 1927 and featured piston valves, Walschaerts valve gear and Gresley derived motion; the Hunts were fitted with Lentz rotary cam poppet valves.

Some of the Shires were built with Lentz oscillating cam poppet valves and classified D49/3 but they were rebuilt in 1938 to conform with the remaining Shires' specification.

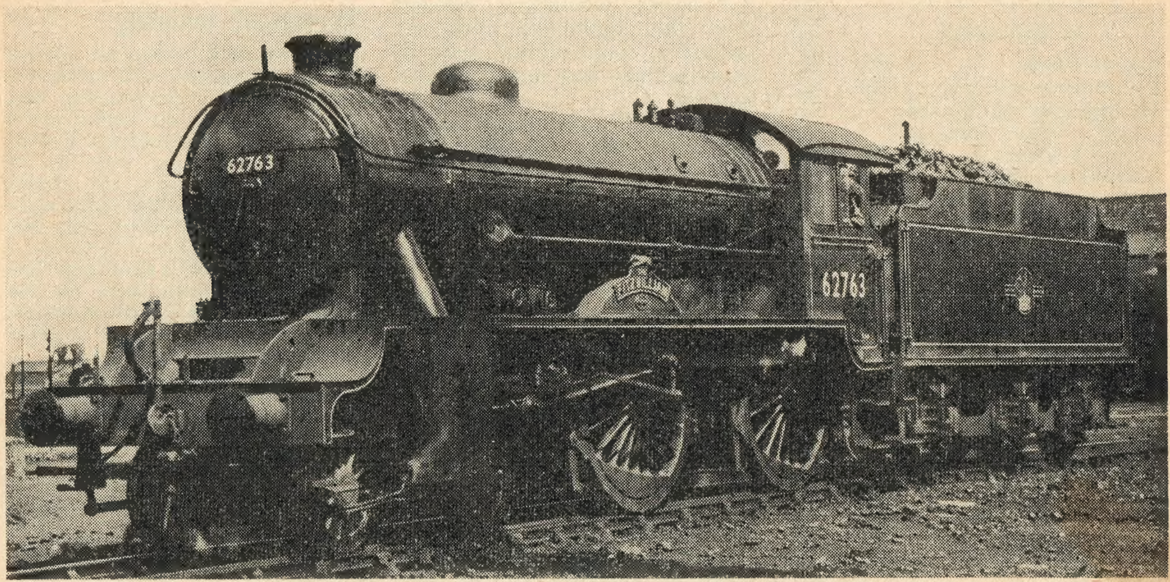
Holiday to hospital

IT is tough luck when you return from holiday and have to go straight to hospital. But that, unfortunately, is what happened to Martin Evans.

At the time of writing he is in Chase Farm Hospital, Enfield, for the observation of a suspected illness. I hope that I have brighter news about him next week.

Next week

Edgar T. Westbury tells the fascinating story of Anzani, a world famous name in the history of internal combustion.



THE FITZWILLIAM, *one of the Gresley* 4-4-0 *Hunt class, photographed at Hull Dairycoates in* 1959 *by Brian Western*

Class of its own

One of the Hunts had its own classification, D49/4. This was *The Morpeth*, No 62768, which was rebuilt in 1942 with inside cylinders, Stephenson valve gear and piston valves. But in 1953 *Morpeth* was involved in the Starbeck collision and was scrapped; and so the class began and ended with that sole representative. It was also the first Gresley 4-4-0 to be broken up.

The Shires and Hunts escaped the acetylene torch for some time, but during the past 12 months scrapping has been ruthless and what were once batches of 34 Shires and 42 Hunts have been reduced to six Shires and no Hunts at all. Within the next few months the remaining Shires are expected to go the way of all steam engines and thus the last example of a 4-4-0 will disappear from Eastern Region lines.

There is a little consolation to be found on the Southern, Midland and Scottish Regions where 4-4-0s, for the time being, remain in service.

CHUCK . . . . . . THE MUDDLE ENGINEER

Salute to an OLD LADY

By OLIVER SMITH

AFTER 77 years of meritorious service in the towing fleet of William Watkins Ltd, *s.t. Hibernia*, the oldest ship-towing tug on the Thames, has made her last journey. Casting off from the Royal Terrace Pier at Gravesend, she steamed majestically up river to the breakers' yard.

For those gathered on the pier to bid her farewell and the more privileged ones aboard who were to accompany her on her last journey, this was a sentimentally sad occasion. Stories were told of her achievements and of the glory with which she had covered herself. One old man who had sailed the Seven Seas and had now swallowed the anchor, spoke of her as his first ship. Another compared her with *Columbia* her sister ship. And so it went on.

It is difficult to find words to describe and capture the atmosphere of an occasion such as this. Unless one has a love for ships it is impossible to imagine the experience.

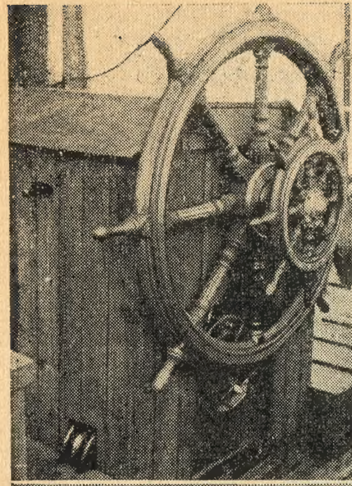
The climax of the unofficial ceremony was reached when the grand old lady, with her long white service pennant (one foot for every year) proudly fluttering in the spring breeze and her house flag at half mast, was gently eased out into the river by the man who had been her Master for 32 years, Bertie Youseman. At that moment every ship, tug and small craft in the vicinity paid its own tribute and gave forth a farewell salute on its siren. The air seemed electrified with emotion as the short sharp blasts from the different pitched sirens sounded across the water. And so *Hibernia* began her last short journey with an escort provided by the Thames Pilots at Gravesend.

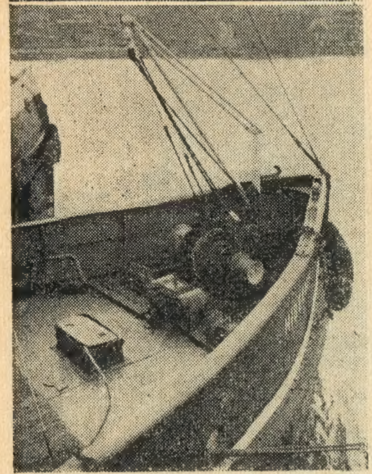
The national press and BBC Television were there. But the real story about *Hibernia* lies not so much in her age, outstanding as it is, but in what has been crammed into that three-quarters of a century. What an exciting book it would make !

She set up the first plume of a bow wave in 1884 when she left her builders, de Maatschappy de Mass of Delfthaven, Holland and was one of two tugs ordered by William Watkins. The other was S.T. *Columbia.* In most respects they were sister ships. Many people considered that *Columbia* was the more handsome of the two, particularly in the way she sat in the water. But whatever *Hibernia* may have lacked in looks she made up for in efficiency. Time and trials were to prove that *Hibernia* was the better operational boat of the two.

The Watkins concern had decided four years earlier that the propeller would eventually replace the paddle wheel as a means of propulsion. All new tugs to join their fleet from that time onwards were so fitted. The company learned much from them and all the knowledge gained was embodied in *Hibernia* and *Columbia*; making them the very latest and most up-to-date vessels of their kind.

Columbia was even more revolu-





tionary in design for she was to have a hull of steel construction, something very much in its infancy in those days. It provided her with a much lighter hull than that of her sister tug but it did not turn out to be the success which had been hoped and was given as the main cause for her failure to match the towing qualities of *Hibernia*.

At that time tugs got almost all of their work by contract, seeking, or using a system of communication that makes us smile when we compare it with today's. It meant that the tugs had to go into deep water for their tow and therefore had to be good sea boats. *Hibernia* and her sister were designed to discharge any kind of work for which they might be called upon including long-distance towing which then formed a large part of the work undertaken by the firm. This is distinct from river work where a vessel of smaller size is usually operated.

The principal dimensions of *Hibernia* and *Columbia* were 120 ft between perpendiculars 22 ft moulded breadth and 13 ft 3 in. moulded depth. Her engines were compound surface-condensing and were built by the makers of the tug.

The cylinders measured 23 in. and 47 in. dia. × 24 in. stroke and were capable of producing 530 indicated horse power at 100 revolutions a minute. This was the average full power of the engine but in the event of an emergency it was capable of working up to 600 i.h.p.

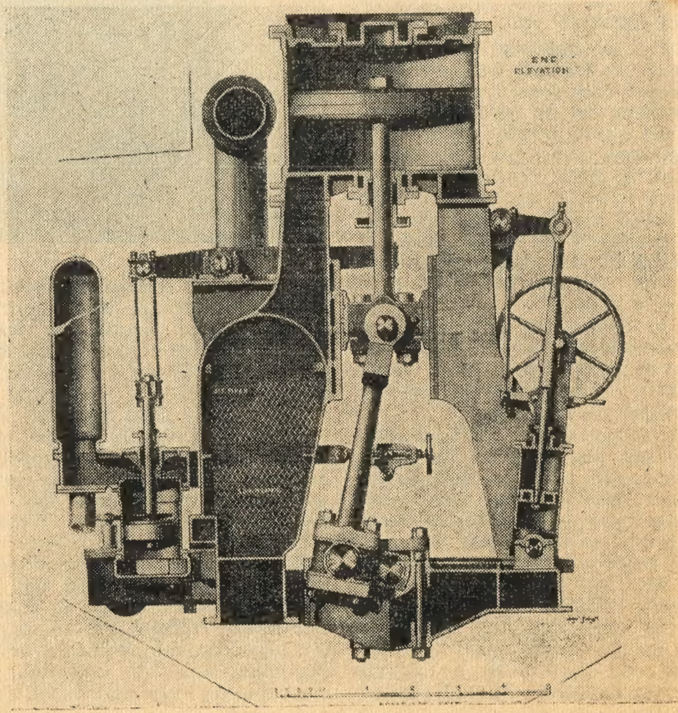
Chatting with Mr Moran the engineer, as he waited for orders to start his engines for the last time I could not help thinking that they could see their century without much difficulty. There was no skimping in the quantity of metal when this engine was built. Every part is robust and generous in proportions.

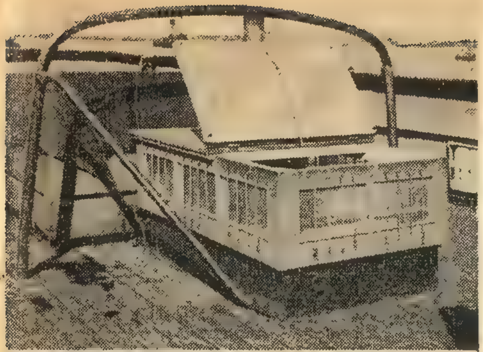
The high pressure cylinder has an expansion valve working on a separate face in a separate casing. To enable the engine to be handled at a moment's notice without need to put the expansion valve out of gear, an auxiliary valve is provided, admitting steam into the main high pressure valve casing. The engine can be reversed to full speed almost instantaneously. This was demonstrated to me by Mr Moran while Brian Western photographed him. If you thought that this week's cover picture was specially posed, you were wrong. The large diameter hand-wheel was flying round while I was showered with drops of oil and condensed steam !

Steam was supplied at 100 lb. pressure from a cylindrical boiler 13 ft in diameter and 10 ft 1 in. long. There were three furnaces of 36 in. dia. and with a total heating surface of about 1,600 sq. ft. In the early days difficulty was encountered in trying to maintain a full head of steam because of the awkwardness of getting a constant supply of coal from the bunker.

In 1885 *Hibernia* and *Columbia* proved themselves for long-distance work by towing two dredgers from the West India Dock to Alexandria. *Columbia* towed Egypt No 1 and *Hibernia* Egypt No 2. Soon after the contract had been successfully completed, *Hibernia* went down to Ferrol in company with another Watkins vessel, the world-famous paddle tug *Anglia*. You will probably know her better by her nickname; she was called "Three-Fingered Jack" because of the position of her three funnels, two abreast abaft of the paddles and one forward of them. The two went to meet the steamer *Chateau Leoville* which had lost her sternpost and rudder. They towed her to Bordeaux.

In the two following years, 1886 and 1887, *Hibernia* further distinguished herself by successfully towing the dredger *Portugal* from Amsterdam





to Oporto, and the *Rotterdam* from the Hook of Holland to Passajes in Spain, and then another dredger and three barges from Antwerp to Lisbon.

Another long distance tow at this period was the hauling of the steamer *Neutwater* from Tables D'Olonne to Newcastle-on-Tyne. As the years passed, so *Hibernia* kept adding to her credit list of long-distance tow, salvage work and operations of an unusual kind.

On the salvage side in 1891 she gave assistance to the Cockerill Company's steamer *Prince Philippe*, aided by *Anglia*, and drew an award from the Courts. It was then arranged for *Hibernia* and *Iona* (which was to have the distinction of being the last paddle tug on the Thames) to tow this steamer of 1,735 tons gross from the Downs to Antwerp.

An unusual tow with which *Hibernia* was associated was the transferring of the first floating dock for the authorities of the Manchester Ship Canal. Together with the Watkin's *Guiana*, she towed the dock from Shields to Ellesmere Port. A year later in 1894 the two vessels towed a second dock for the same people.

I made a brief reference earlier to the lack of any communication system as we know it today. A good example of the conditions is provided by *Hibernia's* salvaging of Hamburg American liner *Steinhoft* with 150 passengers aboard. This big ship was stranded in Start Bay through fog and was in danger of embedding herself in the sand or breaking her back or bottom plating in the heavy seas. The alarm was raised by a messenger on horseback who carried the news to Dartmouth Harbour where, by coincidence, *Hibernia* was lying. She immediately went to the *Steinhoft's* assistance and by some prompt and very careful handling prevented the liner from coming to any harm. The adventure was quite profitable, for *Hibernia* was awarded £1,425 for her action.

In 1895 *Columbia* was re-engined with triples and given a complete new boiler, the work taking roughly two months. The old boiler was given a new inside and fitted into *Hibernia*.

Although *Hibernia* had been passed by engineers as being in perfect condition, the crew had a different story to tell. On several occasions the boiler gave out completely. Perhaps the most humiliating episode was when the tug went to tow the sailing ship *Winlatter*. Instead, the sail ship had to take *Hibernia* in tow

for nearly a day to make sure that she was not lost.

In 1897 *Hibernia* took the steamer *Avalon* from Lisbon to Hull. Two years later she went up to Belfast with *Manila*, another Watkins tug, to tow HM hulk *Grampian* to Plymouth. When *Manila* developed engine trouble, *Hibernia* completed the tow on her own. The hulk was later towed from Plymouth to the shipbreakers at Charlton by *Hibernia*, *Columbia* and *Manila*.

When *Hibernia* was towing the 1,270 ton barque *Fantasie* from Havre in 1900, the engine failed in rough weather, the high pressure piston disintegrating. The engineer, with help from members of the crew managed to take off the cylinder cover and remove the broken pieces.

The resourcefulness of the crew was further demonstrated a year later when *Hibernia* broke a high pressure slide rod off Folkestone. She proceeded under sail and was met off the North Foreland by another of the company's tugs, which towed her home.

In 1906 *Hibernia* assisted the steamer *Forest Brook*, loaded with cargo. The ship was only partly disabled, so that the tug's services were a mixture of towing and acting as escort. *Hibernia* picked her up at Falmouth and went with her to Esbjerg. She stayed seven days discharging part of the cargo, and then went on to Odense to discharge the remainder. When she was finally cleared, *Hibernia* towed her from Odense to the Tyne.

Soon afterwards *Hibernia* joined forces with *Columbia* and towed the first floating dock to be owned by the Navy. It was designed especially for submarine work and was towed from Barrow to Portsmouth.

The towing of the paddle steamer *Basrah* to the Persian Gulf in 1908 was completed without incident in 42 days. A sister ship to the *Basrah* was entrusted to a Dutch tug which took eleven days longer than *Hibernia* to deliver her charge, thereby proving that Watkins were still the top of the class in long-distance towing.

While *Hibernia* was in first-class condition, 1912 saw the end of *Columbia*. After 28 years of outstanding service, her steel hull was past saving, and she was sold to shipbreakers in France.

The coming of the First World War meant a complete reorganisation of tug work. It hastened the end of what must be considered the most

● *Continued on page 820*

Continued from June 15, pages 731 to 733

What CAMERA shall I choose?

EDGAR T. WESTBURY writes his second article on a subject of great interest to many

MUCH discussion has been given to the choice of a camera suitable for technical photography. No type of camera can be completely ruled out for this work, and some excellent technical photographs have been taken by the simplest and most primitive apparatus.

But obviously some cameras are much better for the purpose than others, and their aptness is by no means in proportion to their cost or elaborateness. Some of the worst pictures I have seen have been taken with very expensive cameras. There is often a tendency to expect too much of equipment for which one has paid a lot of good money, but it is no more capable of producing pictures unaided than is the brush of the painter. Unltimate quality depends not on the camera, but on the man behind it. Modern technical cameras are verv expensive, and unless you intend to specialise in this class of work, their cost is hardly justified. Most readers will be more interested in how to get the best results from less specialised or costly cameras.

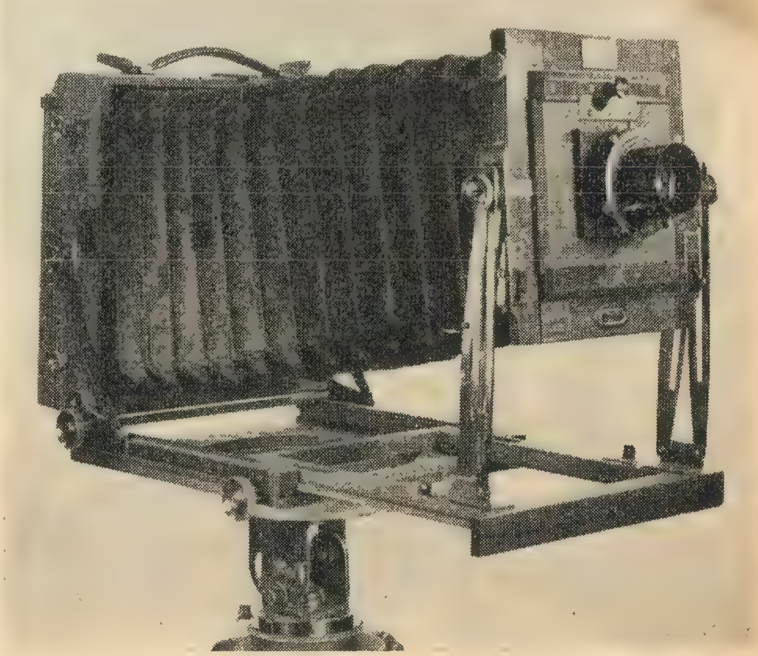
The most popular camera nowadays of course, is the miniature taking 35 mm. films. Although the films can be made to yield good prints if sufficient care is taken in all stages of production, the standard of definition required for technical work is more easily obtained by using larger negatives.

Some of the photographs taken with miniature cameras and enlarged to more than two or three diameters show evidence of heavy grain, surface blemishes, pinholes and scratches. A further advantage of a comfortable-sized negative is that it is easier to carry out retouching or blocking-out on it than on one of very small size. The expense of plates and films is a deterrent to the use of anything larger than quarter plate or 5 in. × 4 in., but these sizes enable quite good contact prints to be made, and the pictures can be enlarged, if needed, up to 8 in. × 10 in. or larger with little loss of quality.

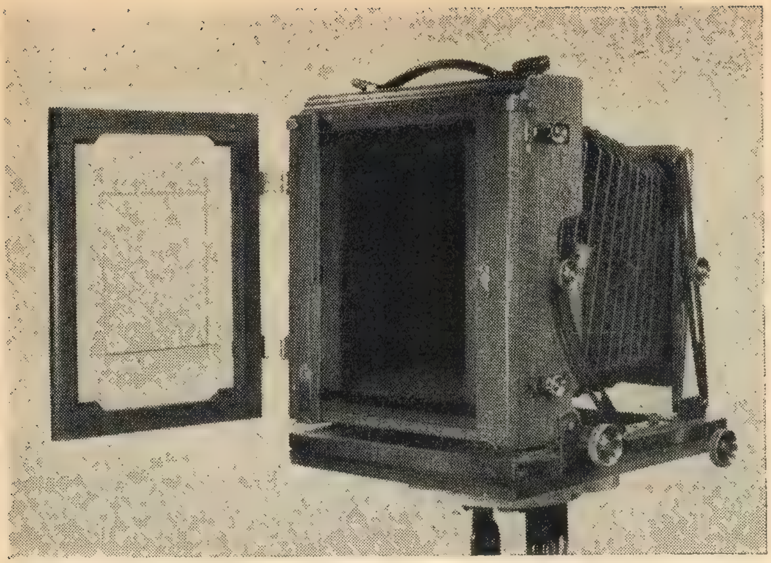
Modern general-purpose cameras, irrespective of size or price, have two serious limitations for technical work, inability to focus properly at distances closer than three or four feet, and an inadequate (and often inaccurate) view finder. The limitations can sometimes be remedied by fitting special attachments, but it is better if they can be avoided. Parallax correction may be provided in the viewfinder, but my experience suggests that it can never be relied upon too implicitly. Focusing distance can be shortened by the use of supplementary "portrait" lenses, but these sometimes affect the critical definition, especially at the corners of the picture. A further disadvantage is that, by widening the angle of view, they are liable to exaggerate the perspective, producing disproportionate enlargement of the nearer objects.

Except where the object photographed is very shallow in the plane of distance, it is always necessary to stop down the lens to a very small aperture to get sharp definition at all depths. Here, the expensive wide-aperture lenses have no advantage whatever over some of the cheaper ones, except that they may facilitate focusing and composing the picture in poor light.

Without doubt, the most suitable camera for technical work is one in which the image can be projected through the taking lens on to a focusing screen. Many experienced users will say that it is the only one



Sanderson stand camera with long extension essential for close-up work. The rising front is at its full elevation



Back of camera opened to reveal focusing screen ruled to show picture area when smaller plates or films are used

worth serious consideration for this class of work. The only popular camera which conforms to the description is the single-lens reflex. Providing that it has sufficient extension for close-up work (usually obtainable by fitting extension lens tubes), it may be regarded as the nearest approach to the truly universal camera. Some modern cameras of this type have eye-level focusing, but they are relatively expensive. As the older types, taking plates or flat films from $3\frac{1}{4}$ in. × $2\frac{1}{4}$ in. upwards, are rather out of fashion for general work, they are often obtainable fairly cheaply from second-hand dealers.

The good old-fashioned stand camera, either field or studio, is perhaps the best of all for serious technical work, because it is equipped not only for direct focusing, but for various movements at both front and back, which are great advantages to composing and focusing, if one takes the trouble to understand their uses.

The studio type of camera is often fitted with back focusing, which is a great advantage for close-up work, as it enables the distance of the lens from the subject to be kept constant in focusing. It is not usually fitted with view-finders, focusing scales, or even shutters, which makes it unsuitable for general use, but none of these adjuncts is necessary or even very helpful in technical work.

Some of these cameras are made in larger sizes than is required, but this is not necessarily a disadvantage. It is quite easy to use smaller plates by fitting adaptors to the holders or even to fit a roll film holder if this is preferred.

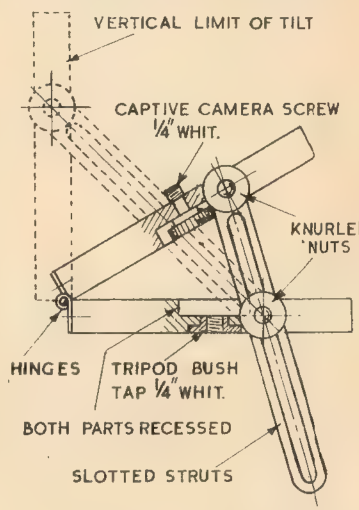
The cameras can be fitted with lenses appropriate to the size of the picture actually taken, but where there is sufficient extension, long-focus lenses may help you to obtain a large image without getting too close to the subject. This avoids exaggerated perspective, but in some close-up work it produces a foreshortening effect which may be undesirable. Foreshortening is very common where small objects have been photographed at long distances, so that they occupy a very small proportion of the negative, and have been subsequently enlarged.

If the camera is not fitted with a lens, it is generally possible to find an inexpensive one that will do all that is needed. The old rapid rectilinear or aplanat lens is quite suitable for technical work. It usually has an aperture not greater than f./8 but, as I have already explained, wide apertures can rarely be used anyhow. In the absence of a shutter, time exposures can be made just as well with a simple lens cap.

As most technical work entails the need for time exposures, it is essential to support the camera quite rigidly, and a good solid tripod may be regarded as a necessary part of the equipment. Some of the light tripods on the market are so flimsy as to be hardly of any use at all for serious technical work, especially if it has to be done out of doors in a slight wind. Wooden tripods built for stand cameras are much better here, though some of them are not above suspicion. Those with a means of tightening the top joints are to be preferred, as the legs do not tend to spread in resting on a smooth surface.

For indoor work it is a good idea to provide rubber pads to fit over the spikes on the legs of the tripod, which also assist in promoting stability. Tripods with a sliding adjustment to the legs are very useful for varying the height of the camera. Another useful and sometimes essential feature is the provision for tilting the camera without need of adjusting the tripod legs.

Camera movements are not used so extensively, or regarded as so important, as they used to be when the taking of a photograph was a much more serious business than it is now. The photographer of 50 years ago took great care in setting up his camera, using a spirit level to ensure that the baseboard was horizontal both ways, or the back vertical,

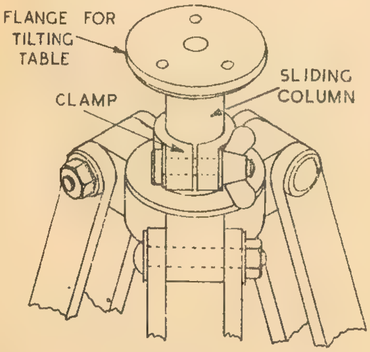


Simple tilting table for tripod

and making full use of the rising and cross front, swing front or swing back, in composing the picture. Probably the influence of the cinema camera, which has the lens rigidly fixed in transverse relation to the focal plane, may have made viewers less critical of rectilinear or perspective errors; at any rate, most popular cameras now follow the same principle by eliminating all or most of the camera movements. Another possible reason for this trend is that many photographers would not know what to do with these movements if they had them.

The rising (or falling) front, consisting of some means of moving the lens panel in a vertical plane, enables vertical lines, such as walls or pillars

in the subject, to be reproduced truly vertical in the negative, when it is necessary to photograph objects either above or below the level of the camera. In extreme instances, the baseboard may have to be tilted, and the camera front and back both set vertical to obtain the same end. Swinging the front or back, either vertically or horizontally, may help in correcting apparently abnormal perspective, or in bringing near and distant objects in different regions of view equally into focus. Cross front, by keeping the front and back parallel to each other and to the subject,



Tripod head with vertical adjustment

may also improve perspective, and produce a more pleasing result than slewing the camera around bodily.

It can be argued that the fixed-front camera sees things in much the same way as the human eye and that angular view points are quite normal. The apparent errors in perspective may be only optical illusions, but the fact remains that such things as converging or diverging vertical columns often produce dizzy, and by no means pleasing effects. It is up to the individual photographer whether he uses camera movements to advantage.

The type of "pan-and-tilt" tripod head used for cinephotography is very useful provided that it can be locked quite rigidly, but it is unnecessarily elaborate for this work. A ball-and-socket tripod head gives the necessary adjustment, but only the largest heads are rigid enough to carry a heavy camera. Much simpler devices often give better practical results, and it is worth while to make them in a size suited to the camera to be used.

I do not propose to say a great deal about home-made camera accessories in this series, though the subject may be pursued further at a later date if it is found to be of general interest. But a brief description of one or two very simple devices which I have made and used may be worth mentioning.

The simple tilting head shown in the drawings was made from two flat pieces of hardwood, one of which carries the screwed tripod bush ($\frac{1}{4}$ in. Whit. for the usual standard camera thread, though $\frac{3}{8}$ in. is used in some cases) while the other carries the camera screw. For a quarter-plate camera, rectangular boards about 4 in. × 3 in. are suitable; laminated wood or plastic laminated board may be used if good hardwood is not obtainable. Two small cabinet hinges are fitted at the front, as close to the edges as possible, and struts with knurled locking screws support the rear end. The struts may usually be had from furnishing ironmongers, or can easily be made from flat brass strip, not less than $\frac{1}{16}$ in. thick. At one time it was possible to buy all sorts of fittings for camera construction, including struts of this kind, but they are no longer sold so far as I know.

Both the boards should be recessed so that they close down to a horizontal position without fouling screw heads, and so forth, and it is desirable to make the struts long enough for the top board to tilt to a vertical position, as this is often found very useful for certain subjects, including copying and flat projection. For convenience in attaching the camera, the centre screw should not be fixed; but to prevent it from getting lost, it should be kept captive by undercutting the screwed end, so that when it is inserted through a tapped hole in the board it will rotate freely but cannot fall out.

Another useful improvement to the tripod is a telescopic head by which the height is adjusted without shifting the leg adjustments. It can easily be fitted to stand camera tripods which have a fairly broad head, to which a flange can be fitted, with a split clamp to carry a round bar or tube. The tilting table can be mounted on this, preferably by screwing it permanently to a plate or flange. I have made and used several other types of tripod head, some of which may be visible in the photographs, but these simple devices serve their purpose quite effectively, and are made quite easily and quickly from readily available materials.

● *Continued 13 July*

See Vulcan's Smoke Ring (15 June) about the special competition in connection with these articles. The coupon is printed below.

PHOTOGRAPHIC COMPETITION COUPON

FOR YOUR BOOKSHELF

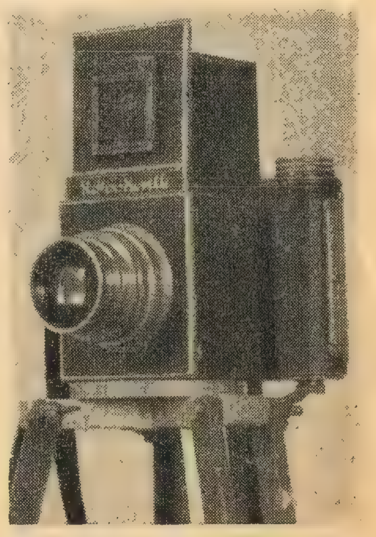
OO Model Railway Operation and Layout *by Norman G. Taylor.* (*Cassell*, 21*s*.)

This is the latest book for the beginner in model railways. It does not compare with its predecessors. For one thing, its price is far higher and its coverage smaller. The illustrations are of rather poor quality and not up to the standard expected of the publishers.

On the other side, the author, G. Taylor, has tried to set out all the facts of scale and gauge as clearly as possible. He has also managed to maintain an unbiased view on the question of proprietary stock. But there just isn't anything new in the book. All the points have been covered by many books before and often in a far better and easier-to-read manner.

The best chapters concern layout; much space is devoted to plans and to accessories for making the layout more attractive and realistic. The section on signalling is also very good. The author shows the positioning of signals for various types of trackwork. This is helpful because the subject of signalling is often hard for the beginner to grasp.

But far too much has been left out of this book or has been touched upon lightly, for it to be of any real value to the railway modeller.—R.O.

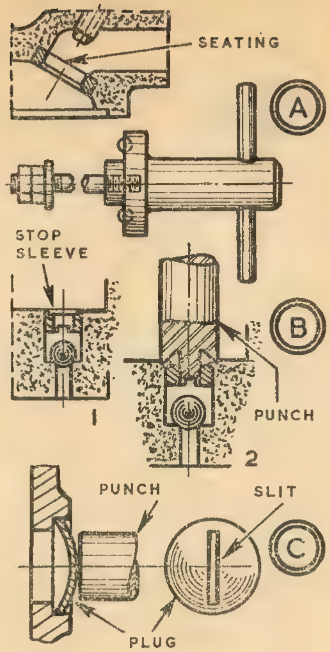


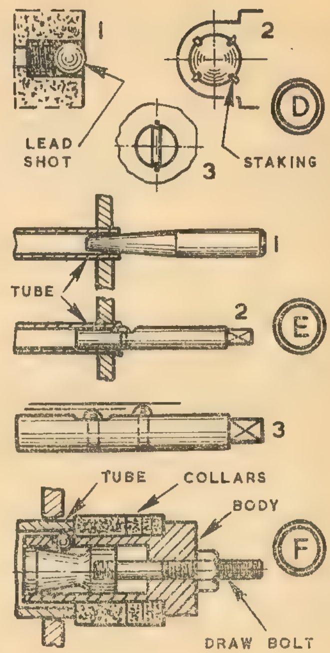
This 2¼ in. sq. Reflex has taken many hundreds of pictures published in ME

PEENING and other SECURING methods

WORKSHOP HINTS and TIPS

By GEOMETER





IN the normal or annealed state, most metals and alloys stretch and flow under impact or heavy pressure, which makes possible a huge range of manufacturing processes, from beating small articles in sheet metal to cold forging heavy components—besides subsidiary operations from simple riveting to expanding the skirts of worn pistons by shot-blasting the interior.

On the principle of displacing metal, parts can be secured against movement and light assembly performed. Thus, a nut can be prevented from unscrewing by judicious use of a centre punch at one or two positions on the end thread of a bolt—which will not prevent the nut from being removed later; while to secure a hard steel ball in the end of a screw to take thrust (or spring-load in a housing as a lock), the end of the hole can be lightly peened to contain the ball.

Another application of peening is as an additional security for a shrunk-in seating for a poppet valve as at *A*. When shrinking-in alone is relied upon, the seating can be straight-sided and fitted in flush with the surrounding metal. But when the seating is to be additionally secured by peening, its extreme outer corner should be slightly chamfered, then the surrounding metal can be carefully hammered or displaced over the chamfer.

Instead of performing the peening by hammering, a tool for the work can be made by machining a holder in mild steel with three hard steel balls let into the face at a radius slightly greater than that of the seating. There should be a spigot to locate in the seating, a central stud with locknuts and a cross handle for turning. Grease holds the balls in drilled dimples for fitting the tool and screwing on the locknuts. A light tap at the end of the shank indents the balls. Then with the locknuts tightened, the tool can be turned to peen the metal over the chamfer on the seating.

On occasion, a ball valve will be fitted, as at *B*1, with a stop or sleeve limiting its lift. When the sleeve is not screwed in, it can be secured by peening. A tool for the work is a hollow punch, *B*2, with a short guide—the guide being turned from the solid, or provided by drilling up the punch and fitting a piece of rod. Cast steel heat-treated, or mild steel case-hardened, can be used for the tool, and for others used for peening thrust balls, or spring-loaded balls, into the ends of screws or housings.

Metal flow in another way is employed to secure core plugs or welch plugs in the jackets of many water-cooled engines. As at *C*, a plug is a mild steel concavo-convex disc, which is placed in a machined recess and tapped centrally with a punch to expand it. When it rusts through, or for other reason begins to leak, removal can be effected by making a central slit with a small sharp chisel, and then levering the plug out. Alternatively, three or four holes can be drilled in line. For fitting a new plug, the recess should be carefully scraped clean and coated with jointing compound.

In certain assemblies, a lead shot may be fitted in a hole after a screw which is not normally to be removed, or which provides a pre-set adjustment. Such a shot, *D*1, is fitted by punching like a welch plug. A plain plug may be secured by staking the end of its hole, *D*2, with a small rectangular-ended punch; while a flush-fitting screw, *D*3, can be held by centre-punching metal into its slot.

For expanding ends of tubes, a taper punch, *E*1, can be used, followed by a mandrel, *E*2, with a let-in ball or hard rivet. The tool can be turned with a tap wrench or brace. The projection of a rivet, *E*3, can be varied by fitting directly in the mandrel or to a filed flat.

Other expansion tools may be on the principle of that at *F*. Here the body contains a hard steel cone operated by a draw bolt to expand a number of steel balls. Washers or collars outside the body allow for adjusting working distance of the balls from the ends of tubes. ▣

 Continued from 15 June 1961, pages 750, 751 and 752

BUSES ON THE RIVER

GEORGE WOODCOCK ends his two-part story of the Penn and Maudslay era

IN Fig. 4 we see an engine used exclusively with the screw and mainly for naval duties. It was introduced by John Penn Jun. in 1845.

The trunk engine, as it was known, had the great advantage, for naval work, of being placed below the waterline. It also had the great disadvantage of a very short connecting rod and of great wear on the trunk and glands and wrist of the crosshead pin. With all this against it, the advantage was great enough to keep it at the front for naval use until about 1870 when it was replaced by the direct acting inverted compound.

A very large number of trunk engines was constructed by Penn at Greenwich and also by the firm of Humphrys and Tennant of Deptford Pier. With the trunk engine, link motion was always employed. While Humphrys used a bar link, Penn preferred a link of box form.

Among the notable warships which were engined with trunks was the *Warrior*, the first seagoing metal-built ironclad and the pioneer of the battleship as we know it, or used to know it. She was designed by John Scott Russell and built by the Thames Ironworks of Blackwall in 1861. The horizontal trunk engines designed by Penn had a bore of 105 in. × 48 in. stroke, took steam at 20 p.s.i., and developed 5,470 h.p. At 54 r.p.m. they could maintain a speed of 14½ knots.

Penn made similar engines for the *Minotaur* laid down by the Thames Ironworks in 1863. The Navy List of 1878 gives over 40 vessels engined by Penn or Humphrys with trunk engines.

The single trunk engine was patented by no less a person than James Watt as long ago as 1784. Penn's patent was for a double trunk in which the volumes of steam at any one time on either side of the piston were equal.

My final example is the diagonal paddle engine, like the one by the Thames Ironworks Company in Fig. 5. For years companies were formed to run a system of water buses on London's widest street. The service opened in 1846 with eight paddle steamers, the *Citizen* boats built by C. J. Mare of Blackwall. They continued to operate for some years.

Thames Steamers Limited, a company formed in 1885, employed three similar vessels with diagonal engines. The final form of water bus was evolved in the service provided from 1905 to 1914 by the London County Council. Of 34 paddle steamers, ten were turned out by J. I. Thornycroft of Chiswick, ten by Napier Miller of the Clyde, four by J. and G. Rennie of Thames Street, Greenwich, and ten by the Thames Ironworks. Seven of those from the Ironworks were engined by Penn of Greenwich. The engines for the other three were constructed in the shops at the Blackwall Yard. Ten small vessels were built at Blackwall between the construction of HMS *Duncan* of 1900 and HMS *Black Prince* in 1906.

With h.p. of 16 in., l.p. of 31 in. and stroke of 3 ft, the engine in Fig. 5 drove 10 ft wheels and worked at 115 p.s.i., developing 360 h.p. at 63 r.p.m. and 13½ m.p.h., with a deadweight of 25 tons from 500 passengers. Few other examples were built on the Thames, but one or two larger ones of about 5 ft stroke were made by Stewart's of Poplar. In my opinion a set would form a highly attractive model.

Maudslay, Sons and Field dates from 1797 when Henry Maudslay

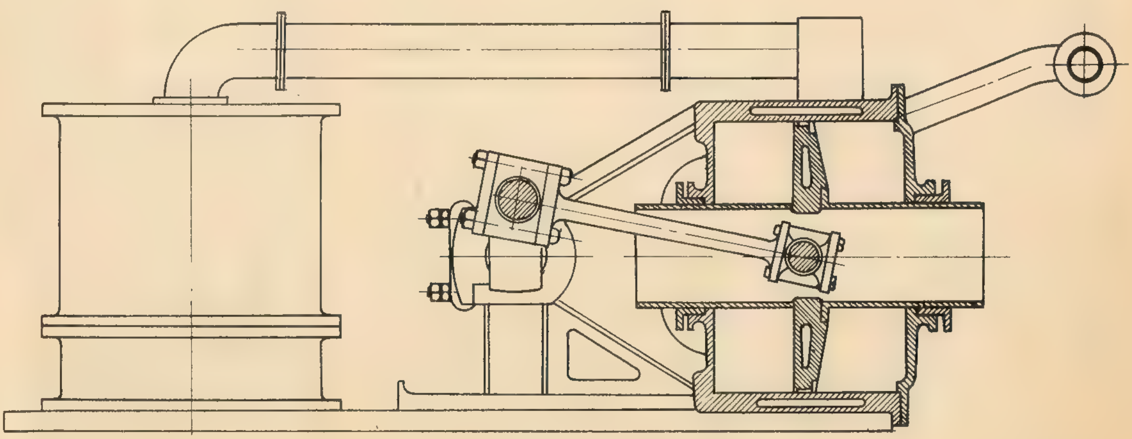


Fig. 4: Penn's trunk screw engine of 1855

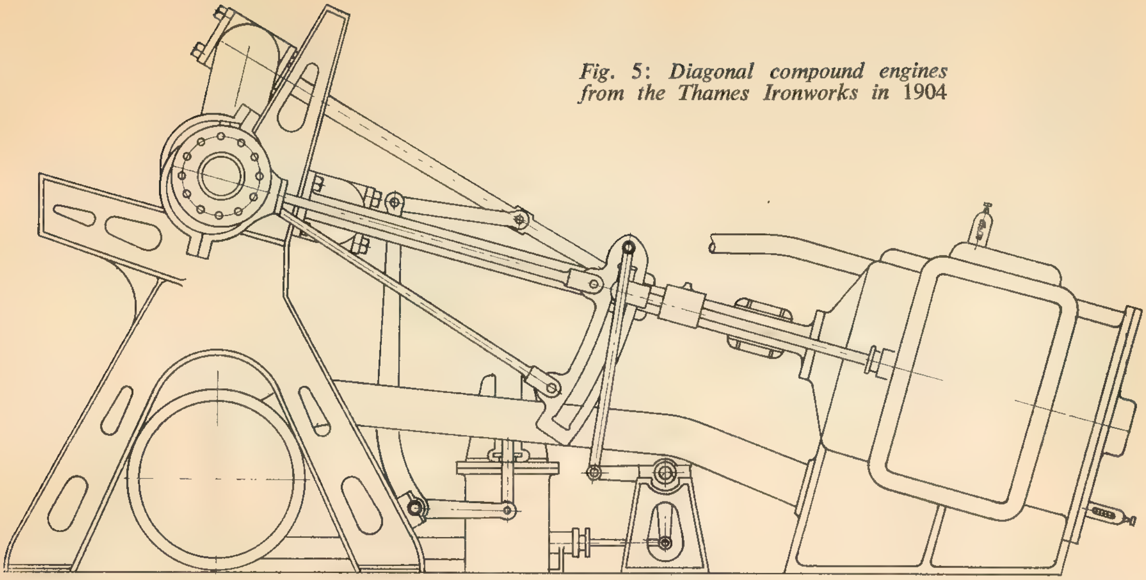


Fig. 5: Diagonal compound engines from the Thames Ironworks in 1904

founded a small shop in Margaret Street. His first job was the making of an easel for Princess Beatrice.

In 1810 Maudslay moved to the site of the Lambeth North Underground station. Here, with Field and later with his sons Thomas and Joseph, he produced a number of marine engines, including inverted tandem compounds for the White Star liners *Oceanic*, *Britannic* and *Germanic* in 1874. The last engines made were for the battleships *Albion* of 1898, built by the Thames Ironworks, and the *Venerable* of 1899. The works closed in 1900.

For many years the engine designer was Charles de Grave Sells. John Penn was a Somersetshire millwright who moved to London and founded a small shop in Greenwich in 1800. From 1825 he undertook the building of marine engines. It was his son John (1805-1878) who made the Greenwich works the famous rival of Maudslays'. Penn introduced the lignum vitae stern bearing first fitted to the *Royal Charter*, lost at sea off Holyhead in the great tempest known afterwards as the Royal Charter Storm.

In 1898 John Penn's was taken over by the Thames Ironworks. It closed down with the Ironworks in 1913. The last contracts were the engines for the cruiser *Chatham* and the battleship *Thunderer* of 1911 by the Thames Ironworks.

The Humphrys, Tennant and Dykes Company was founded by Edward Humphrys, who had been Penn's works manager in 1852. It was mainly concerned with the construction of engines for naval craft. Its finest set of engines, those for the *Drake* of 1900, gave 30,000 h.p. and had cylinders of 43½ in., 71 in. and 81½ in. bore × 4 ft stroke working at 300 p.s.i. Humphrys closed in 1908.

The Thames Ironworks Company was founded as Ditchburn and Mare by Charles Mare, a solicitor, and Joseph Ditchburn a shipwright, in a small yard at Deptford in 1840. They soon moved their yards to the point where the Lea enters the Thames, with Canning Town on the one side and Blackwall on the other. They were one of the first companies to build large scale iron steamers.

At one time Mare employed nearly 3,000 men. In 1857 the works were taken over by Peter Rolt as the Thames Ironworks Company. Many vessels for the merchant and naval fleets were produced before the works closed in 1913. In its last phase it had been in the hands of the Hill family. Mr Hill Jun. was a modeller of some note, and his work is mentioned in some of the early issues of MODEL ENGINEER.

Today we have a memorial to the Thames Ironworks in the famous Millwall football club. It began as the works club known then as "The Irons."

Bibliography

For detailed drawings of engines of the type noted here the builder should consult *The Marine Steam Engine*, Sennett and Oram, 1908; *Recent Improvements in the Steam Engine*, John Bourne, 1865; and various textbooks earlier than 1910, such as Low's *Machine Drawing and Design*, 1898.

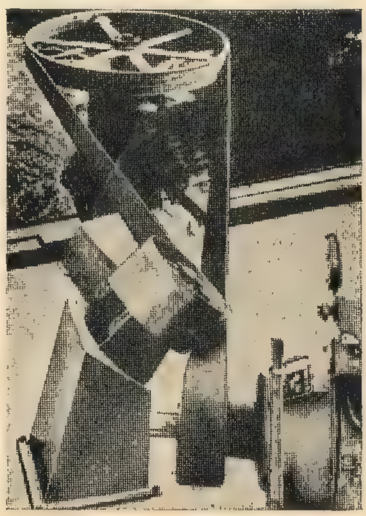
BETTER POWER TRANSMISSION WITH NEW BELT DRIVE

A NEW belt drive incorporates the best features of V-belt and flat belt drives and enables capacity to be increased by up to 50 per cent.

This "Poly-V" drive is a flat belt with a series of parallel V-shaped ribs moulded in its inner surface. They form the driving surface of the belt and completely fill mating grooves on the pulleys, there being no clearance between the two.

In this way, the load-carrying member extends across the full face of the drive, in contrast to the multiple V-belt drive where part of the total drive width available is wasted by the space between the belts, and the grooved inner face of the belt has about twice as much surface area in contact with the pulleys as does a multiple belt drive of similar width.

Introduced into the United Kingdom by Turner Brothers Asbestos Ltd, Spotland, Rochdale, Lancs.

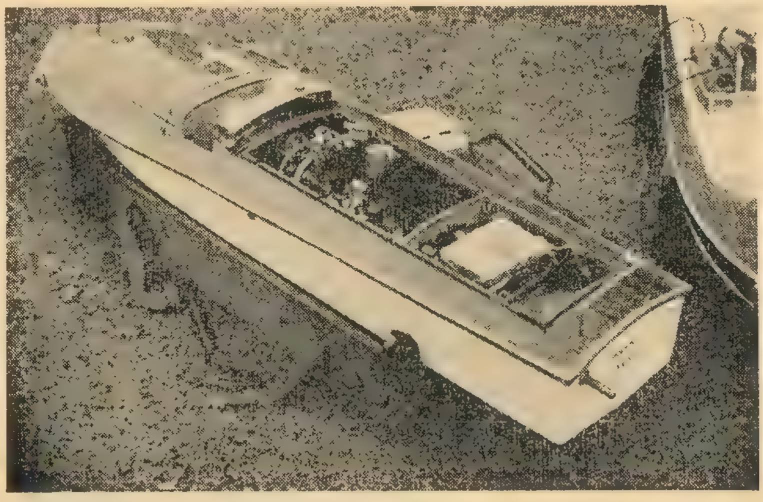


NEWS

REPORTS

Below: Cruiser with Dolphin by J. Pinner of Wolverhampton

1 — Radio control is top at Bournville



BOURNVILLE Regatta, always one of the most popular annual events in the Midlands, was as usual well attended both by competitors and spectators. Some notable changes in the programme were introduced for the first time.

A major part was played by radio-controlled craft, and only one event was held for free-running prototype boats. There were no circular course races for hydroplanes, possibly because the Bournville lake, though one of the best in the country, is notorious for disturbance by prevailing winds, which usually cause disastrous mishaps with high speed boats. This year the water was unusually calm, and though the sky was overcast most of the day the weather remained dry with moderate temperature.

Though most radio-controlled boats nowadays are propelled by commercially-made diesel engines, there were many at the regatta with individually built petrol engines, which were mostly notable for quiet running and flexibility. Dolphin and Kiwi engines are becoming increasingly popular. It is to be regretted that steam-driven boats, which were once predominant at all model power boat regattas, seem to have become almost extinct. Among the few representatives of steamboats were Mr J. Halligan's *Seaspray* and the open launch *Stonefly* by Mr G. Salt of the home club.

Time is always the enemy at regattas, and radio-control imposes

RESULTS

EVENT 1.—R.C. Steering
1. R. Millward (Wolverhampton), 102 points, 1 min. 25 sec.
2. R. Don (Wolverhampton), 102 points, 1 min. 50 sec.

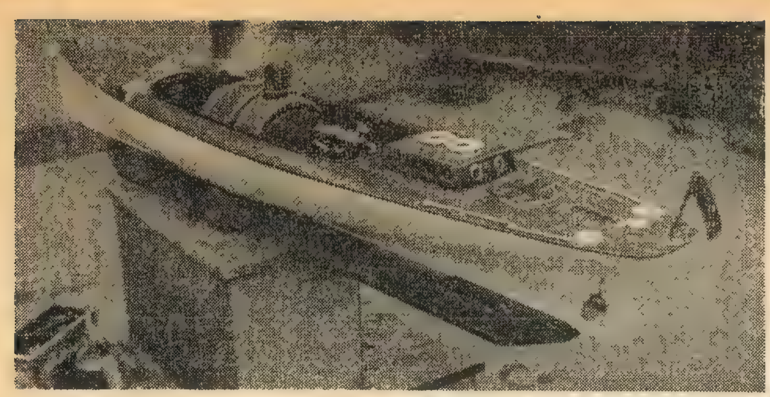
EVENT 2.—R.C. Speed
1. M. Break (Crosby), 1 min. 48 sec.
2. R. Millward (Wolverhampton), 1 min. 50 sec.

EVENT 3.—R.C. Special Speed Class
R. Millward (Wolverhampton), 2 min. 45 sec.

EVENT 4.—R.C. Relay Race (cancelled)

EVENT 5.—Free running craft, steering
1. G. Salt (Bournville), 5 points.

EVENT 6.—Balloon Bursting
1. R. Don (Wolverhampton), 5 balloons.



Left: Mr Salt's STONEFLY *(Bournville) raises steam. Below: Mr G. Starnes of Victoria with his cruiser, Kiwi-driven*

special problems as it is not possible to hurry matters by overlapping the running of boats. The radio-control relay race was abandoned, partly through lack of time and also because of difficulties in making up teams of suitable craft.

Over one hundred boats took part in the regatta.—E.T.W.

2 – Stockport goes to Leeds

WHEN the Stockport Club visited Leeds the weather was rather poor; on a fine day many more would have been present from both clubs. But despite having to dash for cover several times, everyone enjoyed himself—even the drivers who had to take shelter in the tunnel when the rain was really too heavy to continue riding round the track.

R. G. Colbran, now of Stockport, was once secretary of the Leeds club, and it must give him pleasure to circle the track at Temple Newsam which was still a dream when he held office. His well-finished 4-6-2 tank in $3\frac{1}{2}$ in. gauge ran well, and he had the ready help at the steaming bay of a young son and daughter.

Another Stockport visitor was Frank Raw, a schoolmaster whose *Tich* remains a sparkling performer. For such a tiny engine the performance is phenomenal: at speed the motion is a blurr and the exhaust a continuous note. Yet, with a fully-laden weight of, perhaps, 20 lb., she was capable of hauling Mr and Mrs Raw up the sustained bank of 1 in. 200 and 1 in 150 at Temple Newsam.

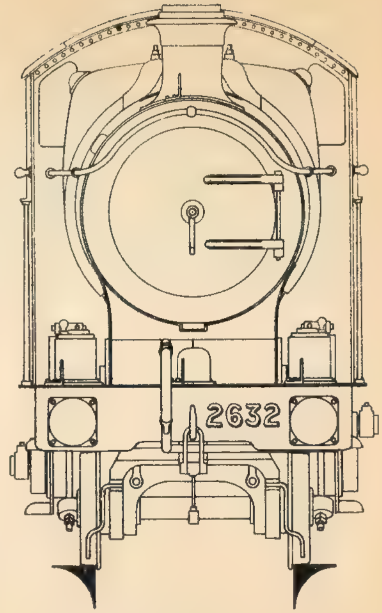
The 5 in. gauge 0-8-0 *Netta* built by G. H. Mann of Knaresborough was interesting for its remote controls. In this scale it is rather a long reach over the tender to the cab, and the builder has made quickly-attachable extensions for the regulator lever, the blower valve, and the water by-pass valve. With universal joints at the cab end, the lever and blower valve come back to a bracket fixed on the tender top, while the by-pass extension brings this control well above coal-plate level. The arrangement may be helpful to live steamers who are not so young, or so slender as they used to be.

A friend of Mr Mann had painted the North Eastern coat-of-arms on the sides of the tender.

—NORTHERNER.

Left: Gerald Claxton ("My father is a full-sized engine driver") proves what he can do with G. H. Mann's North Eastern. Right: Schoolmaster Frank Raw examines the extension controls of NETTA*—hardly needed on his* TICH

LOCOMOTIVES I HAVE KNOWN



T

FROM about 1895 the Great Western Railway seemed to concentrate upon the development of a highly individualistic style of locomotive design, to such an extent that almost any one of its locomotives could be instantly and certainly identified anywhere; but of all the many types and classes of engines designed at Swindon, the Aberdares could be claimed, without fear of contradiction, to be unique, for there were no other goods engines in the world that even remotely resembled them.

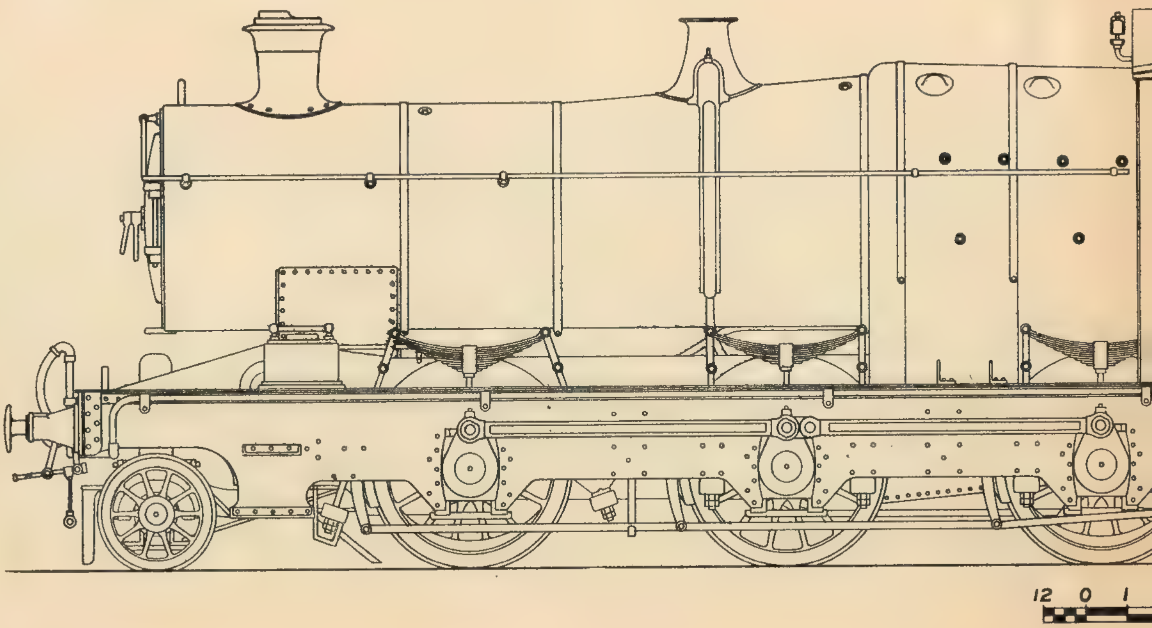
This was all the more remarkable when the design was built up very largely of standard parts and was perfectly plain, simple and straightforward, merely a striking inside-cylindered 2-6-0 with double frames and outside cranks. To me all this was extremely interesting, particularly in later years when I had acquired some knowledge of the intricacies of locomotive design. I was never fortunate enough to travel either on or behind any of the Aberdares; but I saw most of them during the course of many years and was always fascinated by them.

The class had its direct origin in a solitary engine, No 33, which grew, so to speak, out of a number of experimental engines built at Swindon between 1896 and 1900, during an attempt to evolve a really satisfactory type for hauling the very heavy South Wales coal trains through the Severn Tunnel without assistance. The tunnel is straight, but the track through it is in the form of a flat V with a gradient of 1 in 90 down from the western end to a point about midway, and then 1 in 100 up to the eastern end and some distance beyond.

While the tunnel is slightly more than 4½ miles long, the graded length of track including the approaches at each end, is about six miles; and so the engines required for working coal trains of 900 to 1,000 tons weight over that road had to be powerful.

No 33 was built in August, 1900 and was somewhat smaller and lighter than any of the experimental engines that had preceded her; she was undoubtedly neater in external appearance. In broad terms, she was a 2-6-0 version of the *Atburn* [ME, 17 September 1959] except for her pony truck and very small coupled wheels; but she succeeded where her predecessors had failed, with the result that in 1901-2, 40 further engines like here numbered 2621 to 2660 were put into traffic. They were subject to sundry experiments in boiler design though the boilers were all of the Standard No 2 size some with cylindrical barrels like No 33, and others with tapered barrels.

September of 1902 brought a change to the larger, Standard No 4, boiler which was fitted to engines 2661 to 2680, built between September and December 1902. Of these, the



The GWR 'ABERDARES'

Cumbrous though they were, they inspired J. N. MASKELYNE to pay them this affectionate tribute not long before his death

boiler on No 2661 was unique in being supplied with a cylindrical barrel. It was the only No 4 of this kind ever made. All the others had tapered barrels, which eventually became standard for the whole class.

In July and August 1903, Nos 2611 to 2620 were added to the class, which then numbered 71 engines, including No 33; no more were built until 1906, when nine more arrived in a curious order: 2607 and 2608 in January; 2601, 2603 and 2605 in February; 2604 and 2610 in April; 2606 in May and 2609 in December. Finally, 2602 came out in January 1907 and completed the class. The reason for this apparently haphazard order of construction was that 2601 to 2610 were replacements of ten extremely ugly and ungainly engines, known as the Krugers, one of them a 4-6-0 and the other nine 2-6-0s, which had been built for trial purposes between December 1899 and June 1903. The last ten Aberdares were built in the order in which the Krugers were broken up.

No 33 was rebuilt with a No 4 boiler in January 1903, and in December 1912 she was renumbered 2600 to bring her into line numerically with the rest of the class, of which she had been a representative since 1903.

It is scarcely surprising that these cumbrous, even clumsy, but curiously fascinating and highly successful locomotives were worked extremely hard. At first they were almost exclusively employed on the South Wales coal traffic which they worked through to London and, via Hereford and Shrewsbury, as far north as Chester. But after about 20 years, Churchward's 2800 mineral engines succeeded the Aberdares which then became more widely distributed over the GWR system. Some of them, including 2632, came to be stationed in London and I recall seeing them used on the heavy and important goods trains to Birmingham and the north, as well as to Wales and the West.

Their chimneys

As a class, the Aberdares displayed a remarkable variety of chimneys; at first they all had the Dean plain cast-iron chimney of the Atbara type. This was the regular pattern for about eight years. In 1908 for some reason that was never explained, a special chimney was introduced, with a rather steeply tapered barrel below a parallel-sided copper cap. This pattern seemed to be the perfect match for the general ungainliness of the engine! But about three years later, the Aberdares had a variant which was very similar except that the copper cap was tapered to match the barrel, as shown in my drawing of No 2632. Later still, during the 1914-18 war years, both these special chimneys began to be replaced by the modern tapered cast-iron one; in the meantime, City-class copper-capped chimneys appeared on some of the engines.

Aberdare cylinders had a diameter of 18 in., and a stroke of 26 in.; the diameter of the pony wheels was 2 ft 8 in., and of the coupled 4 ft $7\frac{1}{2}$ in.; the wheelbase was 22 ft 6 in. divided into 7 ft 6 in. plus 7 ft 6 in. plus 7 ft 6 in.; and the overhang was 1 ft 9 in. at the front, and 5 ft 3 in. at the back.

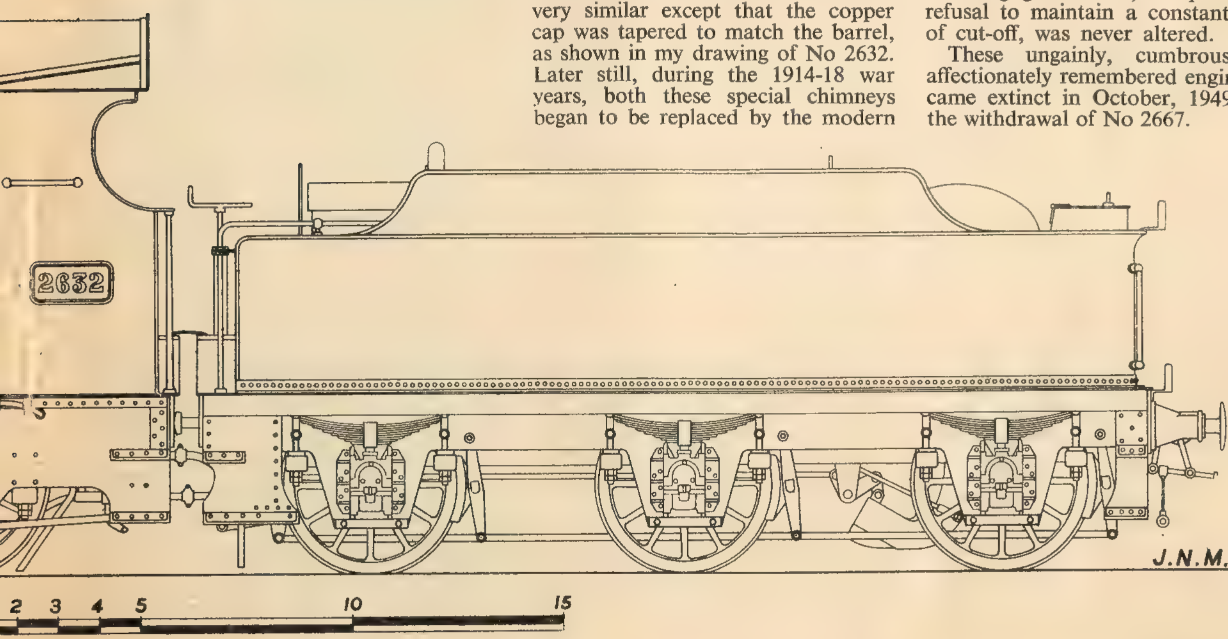
The boiler barrel was 11 ft long and was made in two rings, the front one of which was 4 ft $10\frac{3}{4}$ in. dia., while the back one tapered from 5 ft 6 in. to 5 ft $0\frac{1}{4}$ in. The centre-line was 8 ft 3 in. above rail level.

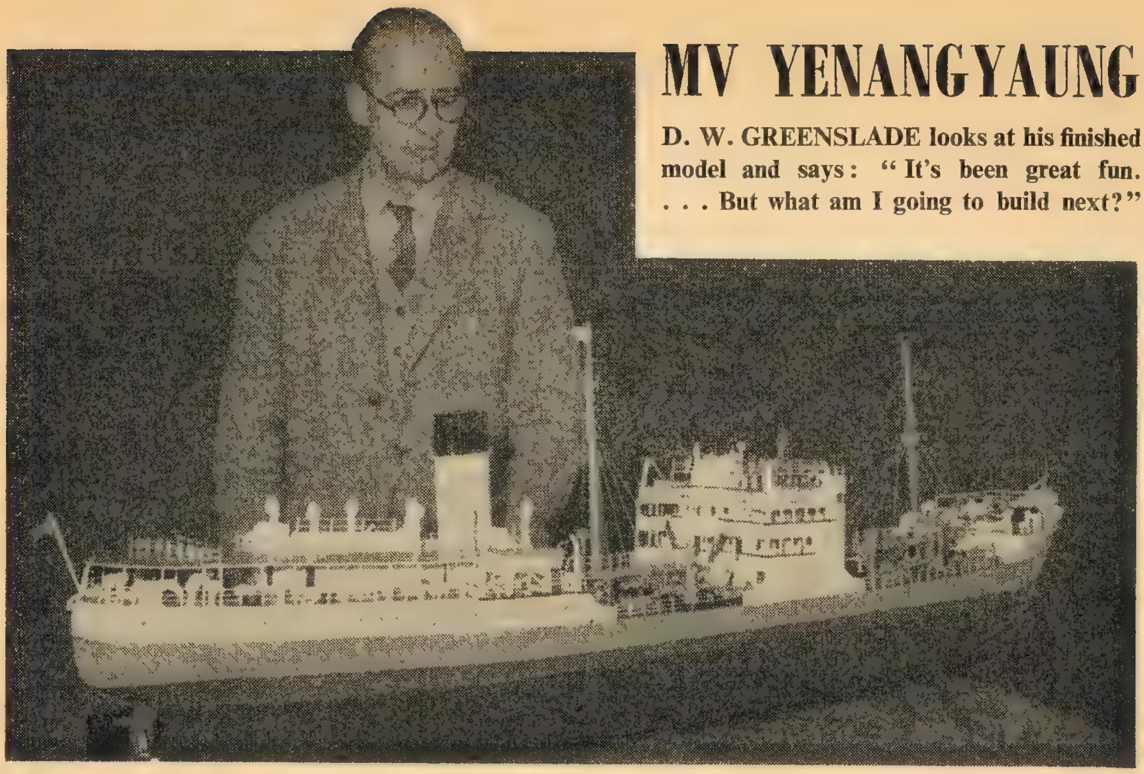
There were 235 tubes of $1\frac{5}{8}$ in. dia. and 14 of $5\frac{1}{8}$ in., giving 1,349.64 sq. ft of heating surface. The crater firebox was 7 ft long and the inner one 6 ft $2\frac{1}{2}$ in., and the heating surface was 128.72 sq. ft, making the total evaporative surface 1,478.36 sq. ft. Grate area was 20.56 sq. ft and pressure 200 p.s.i.

In working order the weight of the engine was 56 tons 15 cwt, with 7 tons 2 cwt on the pony truck, 15 tons 4 cwt on the leading coupled axle, 17 tons 10 cwt on the driving, and 16 tons 19 cwt on the trailing. With the GWR standard 3,000-gallon tender seen in the drawing, the total weight was 93 tons 10 cwt; but after 1929, more than half the class was fitted with Great Central 4,000-gallon tenders from scrapped ROD 2-8-0 engines, putting the total weight up to 104 tons 9 cwt.

The class was equipped with steam reversing gear which, in spite of its refusal to maintain a constant point of cut-off, was never altered.

These ungainly, cumbrous, but affectionately remembered engines became extinct in October, 1949, with the withdrawal of No 2667. ■





MV YENANGYAUNG

D. W. GREENSLADE looks at his finished model and says: "It's been great fun. . . . But what am I going to build next?"

She moves with grace

To complete the fo'c'sle deck details, roller fairleads are set in a recess in the steel bulwarks, and the ship's bell hangs from one of the awning stanchions. Against the fo'c'sle bulkhead there are a square water tank, a rotary hand pump, and a spare bower anchor. A spare stream anchor is stowed on the poop bulkhead.

Before the decks could be fastened down and the handrails and rigging tackled, the model had to be taken to the pond for flotation tests, and the lead ballast had to be secured inside.

The model is built to scale displacement, and requires quite a load of lead to bring her down even to her lighter winter-loaded draughts. I decided against loading her down to her summer draught, as she will be quite heavy enough to cart around as it is.

My friends are always bringing me odd scraps of lead, as I am perpetually on the scrounge for lead ballast for my models. I melt the assortment of lead scrap, and cast it into convenient size slabs, by pouring the molten lead into aluminium cigarette boxes. It does not stick to the aluminium, and when it is cold the casting can be turned out, drilled, and screwed into the bottom of the hull.

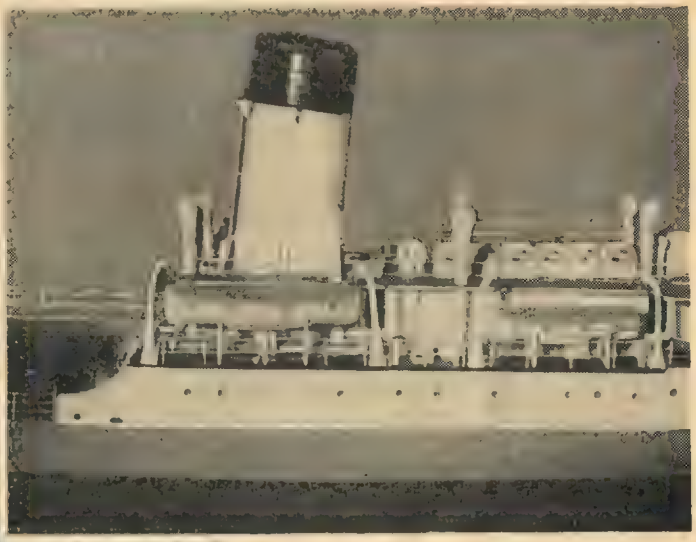
As I am a duffer at mathematics, I find the amount of lead required by trial and error at the pond side. *Yenangyaung* is too big for me to do it in the bath !

The electric motor which is a 12 v., 8-pole ball bearing motor supplied by Bond's o' Euston Road, was of course installed at the time of the flotation test. I took the opportunity when the ballast was aboard of trying the model under power. The motor drives a four-bladed, $2\frac{1}{2}$ in. dia. brass propeller direct without reduction gearing, through a universal joint coupling. With a freshly charged accumulator aboard, the performance on the water is more than adequate.

The ship moves with a grace and dignity which is lacking in a small model and with her ample draught she is very stable.

The only big job left to do now was the rigging. I must confess that it is a job I do not enjoy; it drives me to utter more rude words than almost any other.

Rigging screws I make from small diameter brass tubing, tapered by grinding at each end to form the barrel, which is drilled in the middle of the tommy bar hole. Brass wire rings at each end complete the job, but it is long and tedious. And so, too, is the job of making U-shackles from brass wire.



Shrouds and stays are set up with shackles, turnbuckles (rigging screws) and heart thimbles. For the running rigging, blocks and sheaves have to be made. The wireless aerial has small glass beads threaded on at each end to simulate insulators. There are blocks for signal halyards, boat falls and the accommodation ladder davits.

I have omitted the jumper stay and

some signal halyards as they would interfere too much with access to the accumulator when the bridge has to be lifted off. For the rest, the rigging is pretty complete.

To house the model I have built a glass case; it would soon be ruined if it were left unprotected.

People always want to know how long a model took to build. But an answer such as " three years " means very little unless you know the amount of time which was put in during that period. I have not kept an accurate account of the hours I have worked on the motorship *Yenangyaung*. After some research, I began on the model in December 1958, worked until the end of April 1959, and put the model aside, as I never want to be indoors building models during the summer months. I began again in September 1959 and continued until April 1960, when work was again suspended for the summer. In October 1960 I resumed, and I completed the model at the end of January this year. I work an average of five evenings a week for about 3½ hours. Well, there you are; you work it out !

It has been great fun. But what am I going to build next ? ▣

o *Yenangyaung* (pronounced *Yay-nan-jaung*, with slight emphasis on the last syllable) is a motor vessel of the Burmah Oil Company.

Earlier instalments were published on May 18 (page 603, introductory); June 1 (page 670, Making the Small Fittings is a Pleasure); and June 15 (Page 734, When Odds and Ends are Useful).

HIELAN' LASSIE

By LBSC Coninued from June 1, pages 682 and 683

Why is the oil fed into the steam pipe? Puzzled beginners will find the answer in this instalment on oil pipes and clacks for the LNER Pacific locomotive in 3½ in. gauge

THE last plumbing job at the leading end of the engine is the making and fitting of the oil pipes for cylinder lubrication. Two small clacks or check-valves are needed; they are really a kind of extra check on the oil feeds, because a properly-made lubricator will work perfectly with one clack only, or even none at all, provided that the port in the pump cylinder does not bridge the ports in the stand, thus allowing steam to blow right through into the oil tank.

I usually specify two clacks, as for water-pumps. This makes certain steady delivery of oil. Sections of the two clacks are given here; and the method of making them, and fitting the ball-valves, is precisely as detailed out for the two clacks on the boiler backhead. The oil clacks are much smaller, being made from 5/16 in. bronze or gunmetal rod; the ball chambers are drilled 3/16 in., and bottomed with a D-bit of that size, the holes through the lower part being drilled No 44 and reamed 3/32 in. for 1/8 in. ball-valves.

A ball-valve in a water pump, or in a clack used for water, with boiler pressure above it, will seat tightly without any aid, as long as the seating is true. This is not so in an oil-clack used for the heavy grade of oil needed for correct lubrication of cylinders and valves taking steam at a temperature of 600 deg. or over. The balls float in the heavy oil; this is not to say they would float on the surface if you dropped them into a tin lid or saucer containing the oil. They would sink all right, but so slowly that an oil-pump might make another stroke or two while they were thinking about settling on the seatings, so that oil would run back into the pump-barrel, and delivery would be either intermittent or would cease altogether.

For that reason, the cap of the clack feeding the outside cylinders is drilled, and furnished with a spring, as described for the upside-down clacks on the lubricator. The thoroughfare nipple on top of the clack feeding the inside cylinder is counterbored for half its length to admit a similar spring; and the top coil of the spring should be opened up to a tight fit in the hole, so that the spring cannot slip into the 3/32 in. oil-way through the union section of the nipple.

After machining the body of the clack for the outside cylinder feeds, poke a No 43 drill clean through it, 3/16 in. from the top, and fit a length of 3/32 in. copper tube into each side, silver soldering it into the clack body.

Now note—very important, this—that unless the two oil pipes leading from the clack to the right- and left-hand cylinders are *exactly the same length*, one cylinder will get more oil than the other. A shorter pipe offers less resistance to the oil, and more will go through it; a fact often overlooked by the good people who put engines on paper instead of on the track.

After silver soldering the pipes, put a little loop in one of them, close to the clack, hold it in the position it will occupy on the engine (a little to the right of the inside guide-bar, opposite the valve-spindle) and cut the pipe to such a length that it will just reach the 7/32 in. union nipple on the left-hand steam-pipe just above the flange on the steamchest.

Then cut the other pipe to exactly the same length, and fit 7/32 in. × 40 union nuts and cones to the end of each. In finally coupling-up, it does not matter whether you coil the right-hand pipe twice, or make an oval coil or a loop; any old way will do, so long as it looks neat, but the two pipes *must* be equal in length between the clack and the unions on the cylinder steam-pipes.

Beginners frequently ask why it is necessary to feed the oil into the steam-pipe instead of direct into the steamchest. The answer is that the rush of steam picks up the drops of oil and converts them into a spray or mist, which reaches every part and lubricates it much more effectively than if the oil were introduced straight into the steamchest and left to find its own way about.

The lower end of the clack is connected by a piece of 3/32 in. pipe, with a 7/32 in. × 40 union nut and cone on each end, direct to the outlet clack on the underside of the lubricator, fed from the larger pump. It does not matter about the actual length of this pipe. Nor does it matter which course the pipe takes between lubricator and clack; underneath the inside cylinder, close to the lubricator drive-rod is as good a route as any. No support is needed for the clack, as it weighs only a fraction of an ounce, and this is easily sustained by the three pipes; neither will vibration affect the spring-loaded ball.

After machining the clack-body from a bit of 5/16 in. rod, to the dimensions given for the clack for the outside cylinders, drill a 1/8 in. hole in the side, 3/16 in. from the top, and fit a support in it as shown in the sectional illustration. Chuck the 5/16 in. rod again in the three-jaw, and turn down 5/16 in. of it to 1/8 in. dia., screwing it 1/8 in. or 5 BA. Part off at 5/8 in. from the end.

Reverse in chuck, turn the other end to the shape shown, and turn a 1/16 in. pip on the end to a tight fit in the hole in the clack body. Silver solder it in. The thoroughfare nipple on top is made by the process for the one on the hollow stay, except that it has a plain stepped hole as shown and no internal thread.

After assembling, drill a No 30 hole in the left-hand frame, 1¼ in. from the top, and about mid way between the lubricator and cylinder. Put the stem of the clack support through this, and secure it with a nut on the outside of the frame as shown. All you then need are two lengths of 3/32 in. pipe, with a 7/32 in. × 40 union nut and cone on each end of each piece. The lengths are obtained from the actual engine.

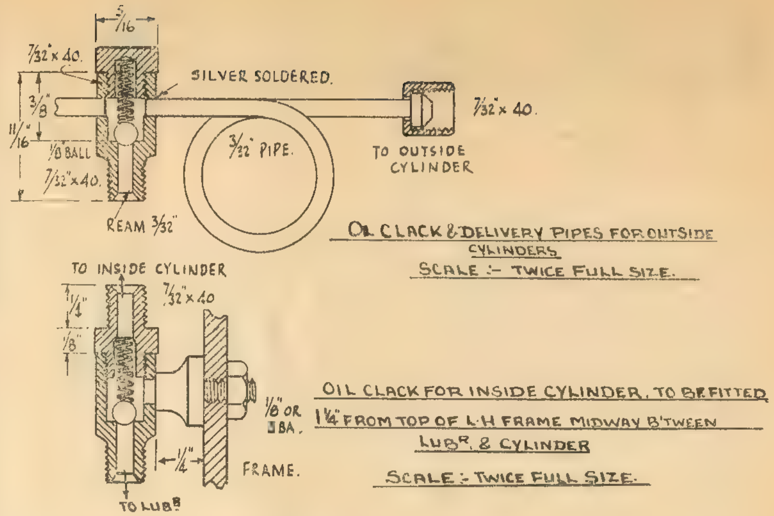
The lower pipe starts from the clack under the lubricator which is fed by the smaller pump, and is coupled to the underside of the clack attached to the frame. The upper pipe starts from the top nipple on the clack, and proceeds via the smokebox saddle, coming shortly to the union nipple on the fitting connecting the steam pipe to the inside cylinder, described in the last instalment.

While I have specified 3/32 in. pipes, for the sake of neatness, 1/8 in. can, of course, be used if the smaller size is not obtainable. I would point out that the oil only crawls through, the pump making one stroke to every 35 revolutions of the driving wheels; the smaller pipes keep cooler, and in

the event of any careless engineman's allowing smokebox ash or any other foreign substance to get into the lubricator and jam up the clack balls, there is not much risk that steam will blow back and stop the oil feed. Remember that the internal diameter of a 3/32 in. pipe is equal to a pipe of 1 in. bore on a full-sized engine, and no locomotive engineer in his right senses would specify oil-pipes of that diameter! On the old LB & SCR engines, the average size of the oil pipes was ⅜ in. and they passed all the oil that the engines required.

To make the twin ring blower for the 3½ in. gauge *Lassie*, bend up two rings of ⅛ in. copper tube as shown in the illustration, letting the ends of the rings come flush against the stock tube. Drill three holes equidistant in each ring, with No 70; be careful not to let the drill splay outwards, but if it inclines inwards a little, towards the centre of the circle, this will not matter much. File up a little T-piece from a bit of ¼ in. × ⅜ in. brass rod about ⅜ in. long; drill longitudinal and cross holes through it as shown in the section, using No. 32.

Fit the two rings in it as shown, and another piece of ⅛ in. pipe long enough to reach to the thoroughfare nipple on the hollow stay, when the two rings are resting on the blast pipe nozzles. Fit a ¼ in. × 40 union nut and cone on the end of this pipe, then silver solder the whole—union cone, T-piece joints, and the ends of the rings—all at one heat. Pickle, wash off, and clean up, and be sure that the whole is perfectly clean inside, because it does not take a very big obstruction to stop up the No 70 holes in the rings. The complete assembly can be connected up to the hollow stay union before the superheater is put on for keeps, the last job before you finally attach the smokebox and erect the boiler.



● *To be continued*

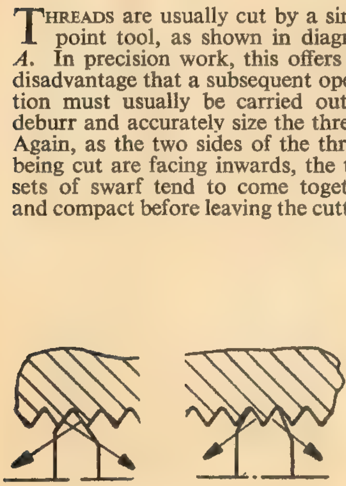
NEW FORM OF SCREWCUTTING TOOL

THREADS are usually cut by a single point tool, as shown in diagram *A*. In precision work, this offers the disadvantage that a subsequent operation must usually be carried out to deburr and accurately size the thread. Again, as the two sides of the thread being cut are facing inwards, the two sets of swarf tend to come together and compact before leaving the cutting zone. In so doing, they may disturb the formation of the thread.

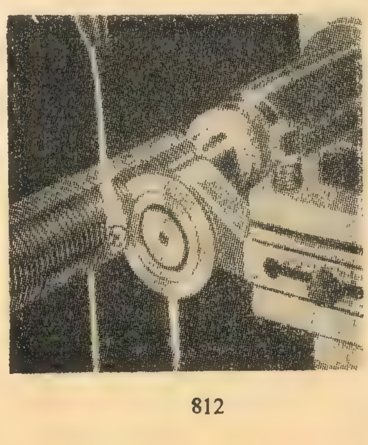
An alternative system uses a female shaped cutter as shown in diagram *B*. It is claimed that this type of cutter produces a true root-form radius while allowing swarf to escape freely.

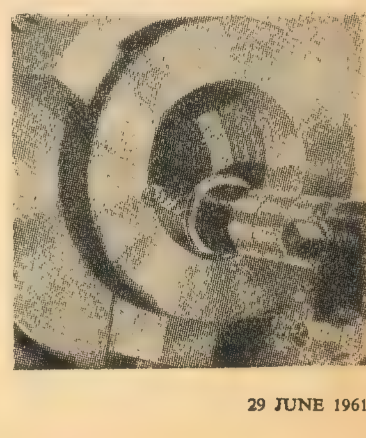
Cutters to this design have been developed for external and internal threads. They consist of disc-type cutters, mounted in special holders which provide for precision adjustment of the lead-angle.

The tool was developed in Switzerland, and is obtainable in the UK from International Engineering Concessionaires Ltd, 39 Parliament Street, Westminster, London SW1.



A B





A GWR 2-6-2 tank engine of the 4500 class, described in three gauges by MARTIN EVANS

AN ME STAFF FEATURE

Continued from June 15, pages 746 to 748

This instalment of the serial which began on February 9 takes in the crossheads, slide bars, gudgeon pins and pump arms for all the models

THE main crossheads are extremely interesting to make and not so difficult as they appear at first sight. As many of my readers will by now be aware, I am not keen on the use of brazing or welding in chassis work, and where crossheads are concerned I prefer a one-piece job when it is possible. But welding is resorted to on the full-size engine as can be clearly seen in my pictures, and so if anyone prefers a three-piece construction I should certainly not try to dissuade him.

As a change, I am giving drawings of the crossheads and slide bars for the 3½ in. gauge and larger engines. (The 4¾ in. and 5 in. gauge components will be identical.)

For the 5 in. gauge crossheads we shall want a piece of bright mild steel of 1½ in. × ⅝ in. section (commercial size) and about 3½ in. long. Saw and file it down, or mill it, to 1⅜ in. wide, face the ends and mill the grooves top and bottom for the slide bars. The grooves are ⅛ in. wide and $\frac{1}{16}$ in. deep, and those without milling machines can cut them by end-milling; the bar is clamped under the lathe toolholder at the correct height, or the machine vice and the vertical slide are pressed into service. With either method, take great care to set the bar square to the end mill. There are several ways of doing this; a quick way is to put on the faceplate and bring the bar up, measuring between the two ends of the bar and the faceplate with inside calipers.

If the builder's lathe has a graduated handwheel on the leadscrew, the saddle can be engaged and the exact depth of cut checked off with this handwheel. Owners of big lathes will be able to remove the metal in two passes, a roughing cut off about 0.060 in. and a finishing cut of 0.0025 in. Those with smaller machines should take it easier, and be content to remove 0.010 in. at each pass. Use slow speed and plenty of cutting oil.

On reversing the bar to cut the second groove, set it as true as possible, and then take a very shallow trial cut, not more than 0.001 in. This will soon show whether the bar is in fact really square.

Before taking the final cut on the second groove, put the micrometer over the slide-bar steps of the rear covers again, and check against the distance between the bottoms of the crosshead grooves.

To mark out the outlines of the two crossheads, arrange the crossheads with the bosses towards the centre of the bar. Drill the centres for the gudgeon pins right through with No 14 and ream $\frac{3}{16}$ in. diameter.

We can now tackle the job of milling out the recess for the connecting rod. For easier work, I strongly recommend making up a little depth gauge. This is simply a short length of 3/32 in. dia. silver steel with a collar of about ⅜ in. dia. and the same length. It can be slid along the rod and clamped with a knurled-head screw about 4 BA.

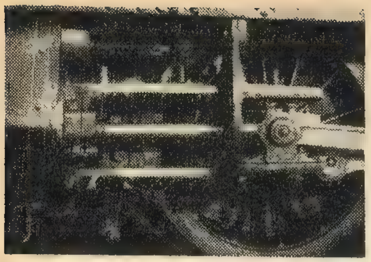
Before you begin to mill, apply the small end of the connecting rod to the outside of the crosshead and lightly scribe around it the clearance required, allowing for the up and down movement of the connecting rod.

Stand the crosshead blank up under the drilling machine and drill four holes of $\frac{1}{16}$ in. dia. in the four corners of the required recess. Check the depth of the holes carefully by sighting the crosshead against the drill. Follow up with a 3/32 in. dia. drill, making a row of holes all around the recess as close to one another as possible, check the depth of each hole with the little depth gauge, and then drill another row of holes about 9/64 in. dia. down the middle, checking for depth as before.

The blank can now be sawn in half and the two pieces faced off truly to a length of just over 1½ in. Set up the left-hand crosshead blank first in the machine vice bolted to the vertical slide, with the blank arranged on its side and a ⅛ in. dia. end mill used in the chuck. Mill out the recess, checking every now and then with the depth gauge. As you get near to the finished depth, bring up the connecting rod and try it in, using a piece of $\frac{3}{16}$ in. round silver steel, together with a temporary brass bush to fit in the small end of the connecting rod.

When the rod can be swung freely in the recess, the milling is completed.

Crosshead of GWR 4500 class engine



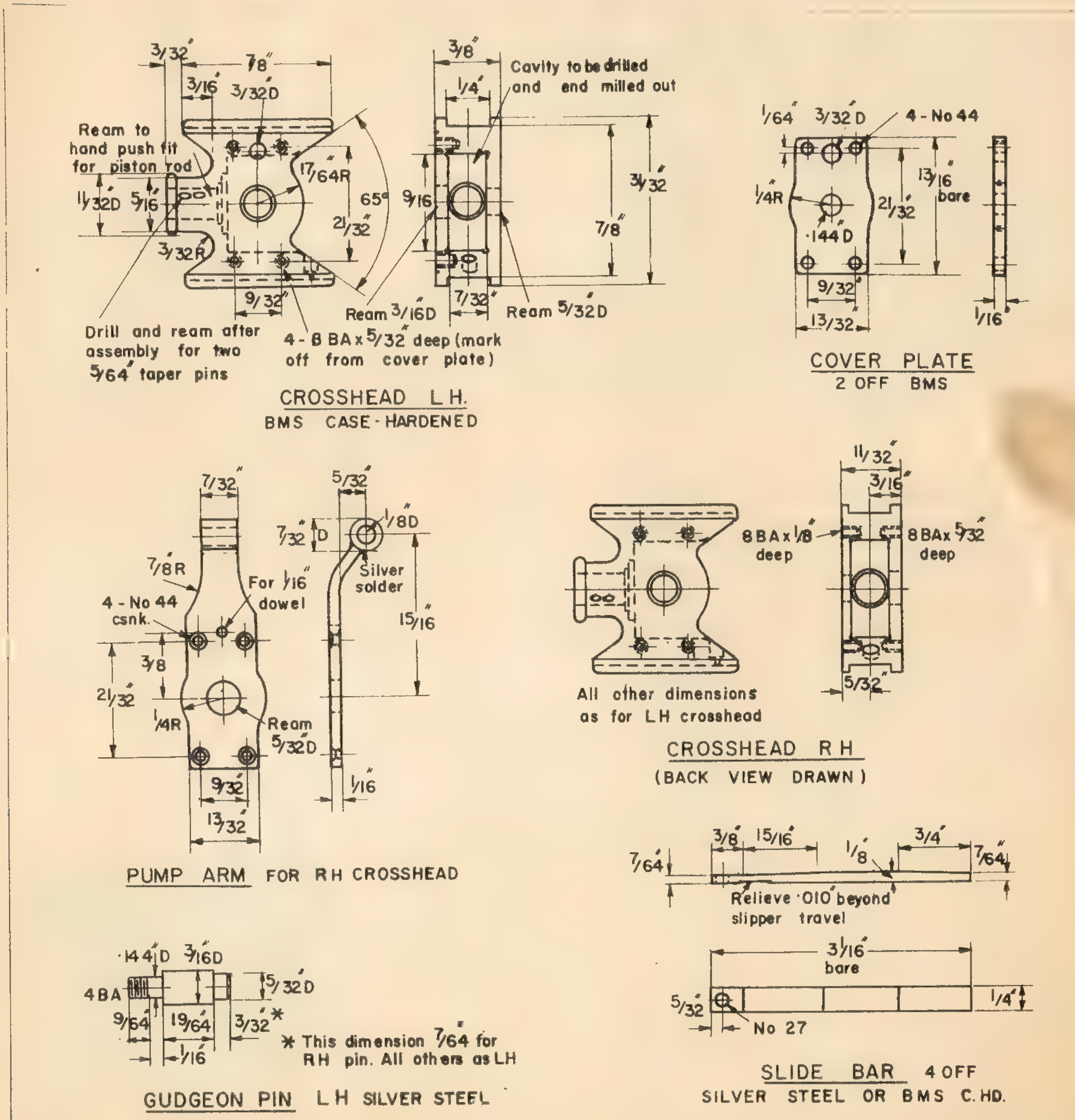
Slide bars and motion plates. Note those oil boxes on the upper bar

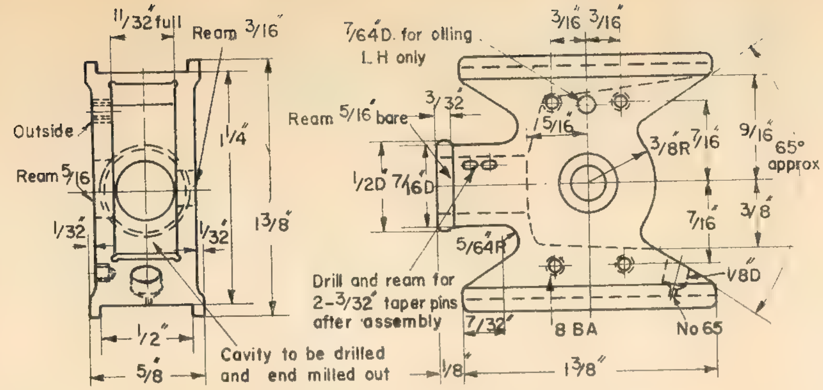
The outer hole can be enlarged to $\frac{5}{16}$ in. dia., and the blank set up in the four-jaw for turning the piston-rod boss. Drill right through the boss, breaking into the connecting-rod recess, with letter N. Ream $\frac{5}{16}$ in., but *do not* put the reamer right through on any account. The hole for the piston rod should be left just a shade undersize so that the rod can be tapped home to its correct position when the motion is being assembled.

A 7/64 in. oiling hole can be drilled on the outside only, just above the gudgeon pin bearing. Drill, too, an $\frac{1}{8}$ in. dia. oil hole for the bottom slipper; it has to be drilled at a slight angle so that the drill can clear the upper one. Two $\frac{1}{16}$ in. holes 0.10 in. apart, for the taper pins holding the piston rod into the crosshead boss, are drilled from the outside at an angle of 45 deg. and must be taken only half-way through the boss at this stage.

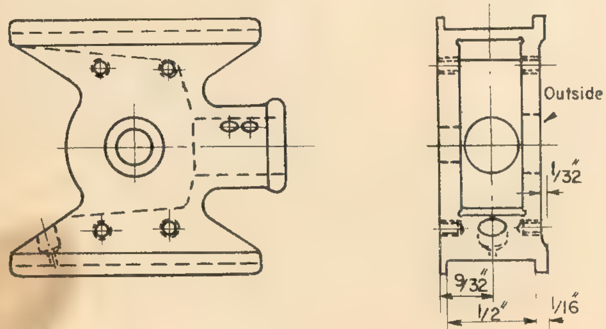
To complete the crosshead, both sides are milled down between the

● *Continued on page 817*

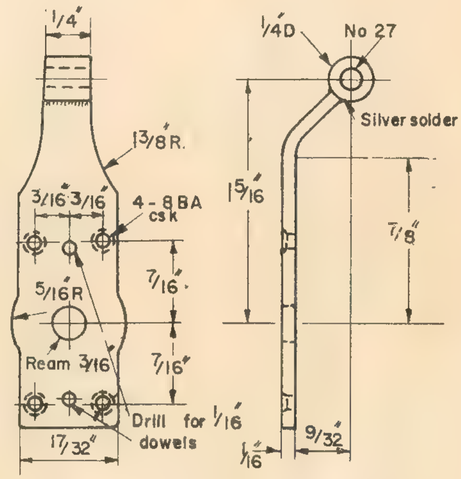




CROSSHEAD L H 1 OFF BMS C HARDENED

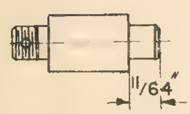


CROSSHEAD R H



PUMP ARM FOR RH CROSSHEAD

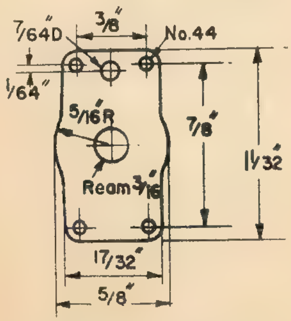
1 OFF BMS



All other dimensions
as for L H pin

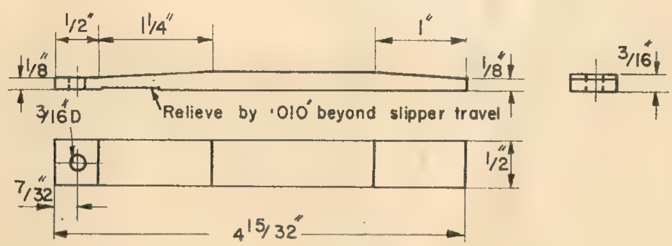
GUDGEON PIN RH

1 OFF SILVER STEEL



COVER PLATE FOR CROSSHEAD 2 OFF

1/16" BMS



SLIDE BAR

4 OFF MILD OR SILVER STEEL

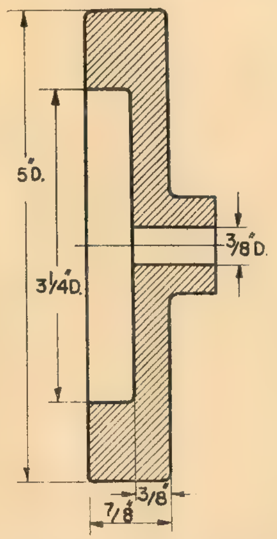
READERS' QUERIES

DO NOT FORGET THE QUERY COUPON ON THE LAST PAGE OF THIS ISSUE

This free advice service is open to all readers. Queries must be within the scope of this journal and restricted to one problem. The replies published are extracts from fuller replies sent through the post: queries must not be sent with any other communications: valuations of models, or advice on selling cannot be given: stamped addressed envelope with each query. Mark envelope clearly "Query," Model Engineer, 19-20 Noel Street, London W.1

Flywheel speed

I have a cast iron flywheel to the enclosed sketch on the motor of my 5 in. gauge electric locomotive. Would you kindly tell me what is the safe maximum speed at which this wheel should run?—J.H.E.R., Kirby Muxloe, Leicestershire.



▲ *Provided that the casting is round, that it is machined all over, and that all sharp edges and corners are removed, your flywheel should be quite safe for speeds up to* 6,000 *r.p.m. It should be properly keyed to its shaft.*

Testing Allchin

Can you please tell me how to get a Allchin 1½ in. scale boiler tested, or if there is any way I can test it myself? I have an air compressor and have fitted the boiler with a car valve and pumped 70 p.s.i. into it, but I do not know whether this is suitable. I can give it some more, but I do not have the boiler stays in yet. It is free of air leaks at 70 p.s.i. —T.M., Hunmanby, Yorkshire.

▲ *It should be quite easy to test your traction engine boiler yourself provided that you have a suitable hand pump.*

If you have not yet fitted the stays, a water test can be made up to 40 *p.s.i., the boiler being completely filled with water and the pressure applied by the hand pump. A large, reliable pressure gauge must be used. If the test is satisfactory, fit all the stays and give another water test, this time going up to twice the working pressure, about* 160 *p.s.i.*

Finally, a proper steam test can be given which should be done at a pressure of 15-20 *p.s.i. less than the water test.*

Clyde Puffer for Singapore

I would be most grateful if you could tell me whether you stock plans of a West Highland puffer.—D.N.A.B., Selarang Barracks, Singapore.

▲ *Mr Harold Underhill of Baltonsborough, Glastonbury, Somerset can supply a plan of a Clyde Puffer called* SEALIGHT *which may satisfy you.*

The set is composed of two sheets. The scale is ¼ in. to the foot, and the overall length of the model is 22 *in. The drawings are* 5*s. each unbound; if you wish the edges bound,* 1*s. extra.*

Vosper craft

I have a model Vosper air-sea rescue launch, which a friend of mine built with length 4 ft 2 in. × 11 in. beam and planked up from double diagonal veneer, with the result that it is remarkably light and strong for its size.

Could you let me know if these boats were fitted with twin or single propellers, and single or twin rudders? What would you recommend in the way of a power plant to give a realistic performance? I rather fancied a Seal petrol engine or two engines geared together if twin propellers are to be used.—W.J.A.F., Butleigh, Somerset.

▲ *The full-sized craft was fitted either with twin or triple propellers. Twin rudders were employed, but on models the fittings are usually simplified and many are fitted with single propellers.*

The Seal petrol engine would be quite suitable. It could be used either to drive a single propeller or twin propellers through gearing. The series of articles on Power for Model Boats was published in ME for 31 *October,* 1957, 14* *and* 28 *November* 1957, 12* *and* 26* *December* 1957, 9 *and* 23 *January* 1958 *and* 6 *and* 20 *February* 1958. (*Issues marked with an asterisk are obtainable from PM Sales Department at* 1*s.* 4*d. each.*)

The series contains details of transmission arrangements suitable for all types of boats.

Jubilee valve spindle

I am building *Jubilee* in 3½ in. gauge as described by Martin Evans, and would be obliged if you would clarify a few points on the cylinder and valve gear.

In the plan view of the valve gear (January 1955, page 14) there is a discrepancy between the centre line of the valve spindle and the rest of the gear. This is 1/32 in. out, and to connect it I can either move the valve spindle outboard by 1/32 in., or move the valve gear inboard by the same amount.

I would like your opinion on which of the two connections you think better if not the easier.

Is there any Hallite jointing between portface and steam chest, and if so is it obtainable in the measurement as drawn or have I to reduce the steam-chest depth by that amount?

This is my first attempt at 3½ in. gauge, and I am eager to get it as

correct as possible.—A.C.B., Sale, Cheshire.

▲ *The* 1/32 *in. offset which you have noticed between the* JUBILEE *valve spindle and the expansion link is quite in order. As the radius rods are long, the offset causes no trouble in practice.*

No allowance has been made for Hallite jointing between cylinder block and steam chest and cover. Thin oiled brown paper is quite satisfactory.

Beginner in Auckland

Having taken ME for about a year now, and having read in this feature about *Tich*, the locomotive for beginners, I would be obliged if you would give me particulars of it.

Although I have not attempted any models before I know a "fair-ish" amount about how they work. I am in a technical class at school, and have had three years' experience on lathes. If I encounter any difficult problems, there is a gentleman across the road who has constructed four or five beautiful working models and will give me advice. I would like to know the price of plans, the price of castings and, if possible, the total price of the model.

Is there a model that is more suitable than *Tich*? If so, could you give me particulars.

Thank you for a wonderful magazine. I would not survive without it. —D.R., Auckland, New Zealand.

▲ TICH *is a freelance industrial type* 0-4-0 *tank locomotive for* $3\frac{1}{2}$ *in. gauge. Outside cylinders and Walschaerts valve gear are used, and it has a coal-fired boiler. The set of drawings costs* 38*s.* 3*d.*

You might also consider ROB ROY *which is a simple* 0-6-0 *tank locomotive for* $3\frac{1}{2}$ *in. gauge based on the Caledonian Railway docks shunter. This uses outside cylinders and Stephenson valve gear and is being described in* MODEL ENGINEER.

A complete set of drawings is now obtainable, at 22s. 6d., post free.

Canberra draught marks

One question on the *Canberra* before Edward Bowness dashes off to America.

If I can find a paint brush fine enough, should I do the draught marks in Roman letters? How about the plimsoll mark?—E.D.M., Lindfield, Sussex.

▲ *Draught marks are usually in Roman numerals, and look neater that way. You will find an artist's sable brush, size O or OO, suitable for painting them. The plimsoll mark will be as usual.*

Ten-inch in Australia

I have been advised to write to you on small locomotives capable of carrying passengers—something in 10 in. gauge class. Do you supply blueprints and castings, or could you advise me who does?—B.H., Mayfield, Newcastle, Australia.

▲ *PM Plans Service does not supply working drawings of locomotives above* $1\frac{1}{2}$ *in. to the foot scale.*

You could try Messrs Bassett-Lowke Ltd, Kingswell Street, Northampton, who have drawings and castings for a $10\frac{1}{4}$ *in. gauge* ($2\frac{1}{4}$ *in. scale) LMS* 4-6-0 *Royal Scot class locomotive.*

Cock o' the North

I have *Pacific Steam* by Martin Evans, and find it very interesting. It mentions the Gresley P2 class *Cock o' the North* which was fitted with three cylinders and rotary cam gear.

Please could you tell me if the middle cylinder drove the same axle as the two outside cylinders? Could you explain the drive for the middle cylinder camboxes?—J.B., Royston, Hertfordshire.

▲ *All three cylinders of the original* 2-8-2 COCK O' THE NORTH *drove on to the same axle. The drive for the cams for the outside cylinders was obtained by bevel gears and a longitudinal shaft from the driving axle. The drive for the inside cylinder cams was probably provided from one of the outside cylinders through a right-angled connection and further bevel gears.*

In practice the engine was not so successful as the Walschaerts geared No 2002. *It was later converted to piston valves.*

FIREFLY . . .

Continued from page 815

slippers to bring the centre part to $\frac{9}{16}$ in. thickness.

The right-hand crosshead is not quite the same as the left-hand, as it has to carry an arm to drive the water feed pump. The outside face is recessed 1/32 in. like the left-hand crosshead, but the inside face is machined right across, with 1/32 in. removed, so that the *overall* thickness of the crosshead is 19/32 in.

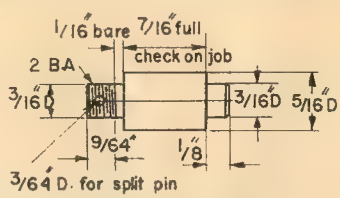
Cut the cover plates which bolt on to the outside faces of the crossheads from $\frac{1}{16}$ in. steel plate. Mark them out very carefully and use them as gauges for drilling and tapping the crossheads 8 BA as shown. The gudgeon pins are turned from $\frac{5}{16}$ in. dia. silver-steel. They should be made with care, to be a nice push fit into the body of the crossheads but a rather tighter fit in the $\frac{3}{16}$ in. dia. hole in the cover plates. Thus, when the plates are removed the gudgeon pins should come out with them.

The pump arm for the right-hand crosshead calls for a silver-soldering operation and for a bit of careful bending. Accuracy here will pay dividends later. Note that after fitting the arm to the back of the crosshead you should fit two little dowels of $\frac{1}{16}$ in. dia. silver-steel, so that the thrust of the pump is not carried entirely by the 8 BA screws. The dowels do not need to enter the crosshead body more than 5/64 in. or they may foul the small end of the connecting rod.

I need not say anything about the slide bars as they are extremely simple. They are held to the rear cover by 2 BA Allen screws; I will deal later with the method of assembly.

Apart from the actual dimensions, there is not very much difference between the $3\frac{1}{2}$ in. gauge components and the 5 in. The body of the $\frac{3}{4}$ in. scale crosshead is cut from 1 in. × $\frac{3}{8}$ in. bright mild steel. Instead of recessing it on both sides, put in a couple of grooves on the outside only, to simulate the join between the slippers and the centre casting in the full-size article.

The connecting rod recess in the smaller crosshead is easier to cut as we have no worry about clearance for the elaborate oil box on the 5 in.



GUDGEON PIN FOR L H CROSSHEAD 1 OFF SILVER STEEL

gauge rods. The right-hand crosshead is machined off at the back in a similar way to the larger crosshead, and the pump arm is attached in the same way, though one dowel pin is sufficient.

In turning the gudgeon pins from $\frac{3}{16}$ in. dia. silver steel accuracy is once again essential. The right-hand gudgeon pin is made 1/64 in. longer, to locate the pump arm on the back of the crosshead. Finally, the slide bars are made from $\frac{1}{4}$ in. × $\frac{1}{8}$ in. silver steel, or mild steel case-hardened and attached by 4 BA Allen screws.

★ *To be continued on July* 13

POSTBAG

The Editor welcomes letters for these columns. A PM Book Voucher for 10s. 6d. will be paid for each picture printed. Letters may be condensed or edited

PUZZLE

SIR,—As a foundryman, I have been rather amused at some of the antics of the moulders and coremakers in the "Black Sand" articles by Mr G. W. Eves. The puzzle about the train guard firing the bullet at the driver to my knowledge has never been solved. I have witnessed fully grown adults in a pattern shop throwing pieces of wood in front of them and at the same time running to try and catch up with the flying timber. I think the first time that I became entangled in this one I threw a bottle and fell out of my cradle.

Mr Eves in the same article [April 20] perhaps unwittingly sets us another poser. Here it is. Charlie makes a mould containing two bearing castings while George sits on an upturned sieve and watches him. (No wonder he never sweats !) Let's assume that the top and bottom parts of the moulding box are 3 in. deep, which is about usual for small moulding boxes. The pouring gate Charlie uses is 3 in. round, which, when withdrawn from the mould, leaves a volume of approximately 21 cu. in. Assuming that the pouring cup is $1\frac{1}{2}$ in. deep and bellmouthed, this adds another 11 cu. in. The pool immediately under the pouring gate and the runner to each bearing will account for a further 8 cu. in., making a total volume of about 40 cu. in. to be filled with metal, in addition to the actual mould itself.

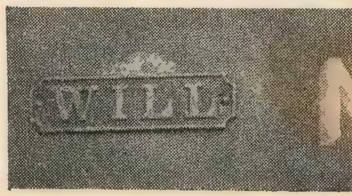
Having quite good visualising powers for approximate weights, at this stage I begin to wonder if the two castings are the main bearings for a barrel organ. I don't even try to guess the weight of the two castings, but I am sure of one thing; it takes almost $12\frac{3}{4}$ lb. of molten gunmetal to fill a volume of 40 cu. in. Now, Charlie and George used a 14 lb. crucible which, of course, in foundry parlance refers to the capacity of the crucible, and after the mould was filled the equivalent of about half a pint of metal was poured on the foundry floor. In other words they had about 4 lb. of metal surplus to the amount of metal actually required to fill the mould. As the housewife said to the chimney sweep when she surveyed the mess in her grate: "Wonder where it all came from ?"

Bearsden, Near Glasgow. W. K. WAUGH.

WEARMOUTH WILL

SIR,—I was greatly interested in the letters in Postbag of April 27 and May 25 on the old 0-6-2 tank engine illustrated in Postbag of March 9. The locomotive carried the name *Gordon* and was at South Hetton Colliery as your correspondents said.

I was most surprised to learn that it was of Welsh origin, as it had so many features which I thought had been familiar in the South Eastern corner of England.



An old 0-6-0 tank engine, built by Andrew Barclay of Kilmarnock in 1903, and working at Wearmouth Colliery, carries nameplates very similar to those of *Gordon*. Its name is *Will*. Could there be any connection ?

It will be noticed in the picture that the buffer beams are of great depth, allowing alternative positions of buffers and couplings for hopper wagons of the old five-ton type and for standard ones. I do not know if they were fitted when the engine was built or at a later date.

Newcastle-on-Tyne. E. H. JEAYES.

Is there a connection between WILL, *the Andrew Barclay tank at Wearmouth Colliery, Durham, and* GORDON *at South Hetton Colliery in the same county* ?

GRESLEY

SIR,—To the two tributes which have recently appeared in Postbag I should like to add my own.

My earliest memories of locomotives are of Gresley Pacifics, and thev have always remained my favourite —by a wide margin.

In this I am not alone. Every

engineman with whom I have spoken at Haymarket sheds is like-minded.

It seems shameful that one of these beautiful machines should not be preserved. I believe that the scrap price would not be an unattainable sum, and so if enough enthusiasts were found to contribute, one of the engines could surely be saved from destruction.

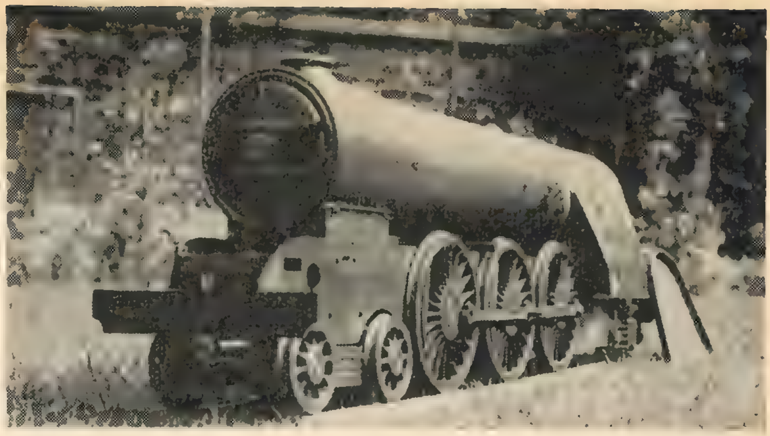
My own 5 in. gauge version represents a first attempt at modal work of any kind. From MODEL ENGINEER and from my fellow club members I have learned enough to progress to the state seen in the pictures.

It has always been my ambition to drive a Gresley, and it became evident when I went to work in a bank that I would have to build my own to fulfil this desire.

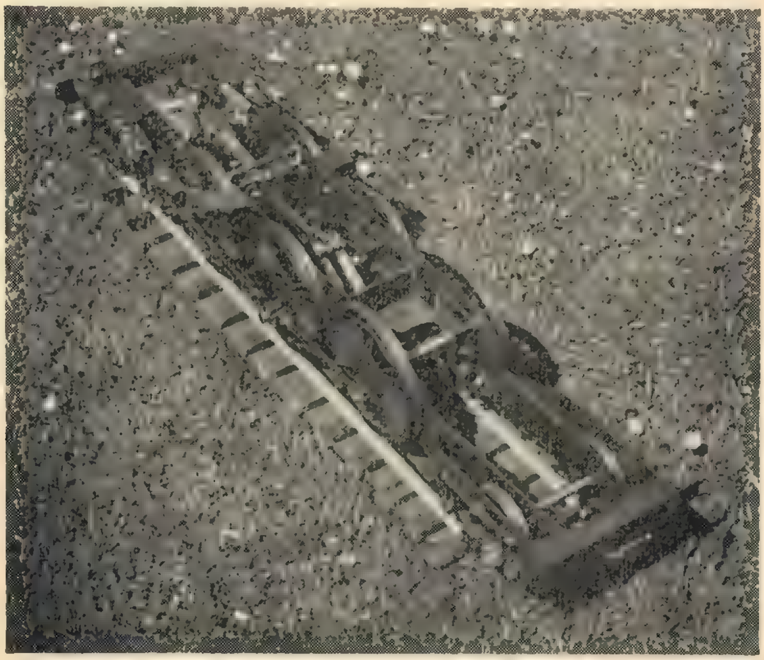
I believe the construction was begun about 1938 by Mr S. W. Carr of Romford. Should he chance to see the pictures and be interested, I should be delighted to report to him more fully.

When complete, my locomotive will be named *Spearmint* out of respect for my friend Norman McKillop (Teram Beg) in whose hands the full-size version became well known. He has promised to put mine through its paces !

Edinburgh. DOUGLAS J. SPENCE.



Douglas J. Spence wanted to drive a Gresley. As this was impossible in a bank, he decided to build a small Gresley for himself. These pictures show the 5 in. gauge engine—its name is SPEARMINT—*as it was last year*



STEAM CRANE

SIR,—In Postbag of March 30, C. R. Sprighton of Durban asked if any reader could identify the steam crane in his photograph.

The object is the undercarriage and main part of the swivelling superstructure of a steam locomotive travelling crane made by Stothert and Pitt Limited of Bath about 60 years ago. It was possibly of four to five tons capacity.

Many of these cranes were used in Royal Dockyards.

Isleworth, Middlesex. J. W. PERKINS.

GRATEFUL

SIR,—I wish to say a very, very belated thank you to ME for its help and co-operation to me when I was trying to get information on p.s. *Bournemouth Queen.* Thank you for publishing Mr G. C. Wren's photograph, and thank you Mr Wren, for sending it.

I am also very grateful to ME for putting me in contact with Mr Edward Hayes of Bournemouth, with whom I am still corresponding. Mr Hayes has been a great help to me, and has supplied many pictures, drawings and sketches of details on the *Bournemouth Queen.* I recently had the opportunity to visit him and to see his excellent and highly detailed model of the *Queen.* He hopes to visit me soon. Thanks to ME, our correspondence has developed into a great friendship.

My model is coming along well, although it is far from completion.

Durrington, Sussex. ANTHONY M. HORN.

SUCCESS

SIR,—It is now one year since our product Tinflo was made available to the public through MODEL ENGINEER, by Mr Westbury's report and then through a series of advertisements.

We have since had many letters from readers and club members, some giving glowing accounts of "impossible" work that has been carried out, and others simply saying that Tinflo does all we claim.

Many more contacts have been made in the original field of industrial use. Through MODEL ENGINEER, for example, we were asked by a leading atomic research firm for help in sealing a modified cooling device. We are pleased to say that it was soldered successfully with Tinflo, in spite of

its inaccessibility and corroded condition.

Tinflo has been proved successful on new work as well as work under repair. A manufacturing firm changed from zinc chloride to Tinflo and increased its output from 140 to 760 units a day.

Distribution is still a problem, but the position is improving. Most Keilkraft dealers are now stocking Tinflo as well as several big London stores.

We thank you for your help in launching our production.

E. D. and L. Hiscox and Son, Essex. L. HISCOX.

HIBERNIA . . .

Coninued from page 797

adventurous and thrilling part of the steam tug's history, the search for sailing ships. With the steam engine taking over from sail, ships no longer required the tug's assistance until they were nearly ready to dock. The last of the Watkins tugs to go down Channel seeking was *Arcadia* in the first week of the war. During this era *Hibernia* had become nearly world famous for she had a record second to none. As it closes, so a long chapter of *Hibernia's* story comes to an end.

Other duties awaited our heroine. She was in perfect condition and was soon in service with the Royal Navy. When she took up her duties with the Downs Boarding Flotilla she was renamed HMS *Carcass*; a battleship of the King Edward VII type was already named *Hibernia*.

It became increasingly evident that she was not being used to her full advantage, and that boarding parties could use smaller craft. She was withdrawn from the Flotilla and reverted to something like her old name. As HMS *Hibernia III*, she was sent out east to the Dardanelles. There she came under fire during the second landing at Suvla Bay on the Anzac front. Luckily she received only superficial damage, and none of her crew suffered any injury. When the Anzac front was finally abandoned, she was one of the last ships to leave.

Her next port of call was the Persian Gulf where she was sent to tow craft to be used in operations there. Finally she went back to home waters in 1916.

After her arduous tour of duty she was badly in need of an overhaul. When the refit had been completed at Grimsby, she returned to service with the Navy, joining the Rescue Flotilla at Buncrana. She was also used for coastal towing.

When the war ended, she went back to deep sea work, but her exploits seem to have been less exciting in comparison not only with her war service, but also with her activities before 1914. Circumstances had completely changed, and she had to be judged in the light of these changes and her ability to cope with them.

There was now less long-distance or coastal towing, and the work was mainly confined to the Thames. But if an occasion arose for an assignment outside the river, the Watkins tugs were always ready to undertake it. An instance of this was provided in 1920 when *Hibernia* was chartered to Furness, Withy and Company. She was towing coal lighters backwards and forwards between France and the North East Coast, and in the course of these duties she also salvaged the French sailing ship *Ville de Nantes*.

With the need for more first-class tugs to cope with the increasing size of the liners using London Docks, Watkins decided in 1922 to adapt *Hibernia* for this purpose. As she had been designed primarily for the deep sea, she was not ideal for river work. Her owners decided to shorten her by taking 15 ft 6 in. off her bow. This was a major undertaking which involved the complete rebuilding of nearly half of the ship. To many it may have seemed, for a craft of her age, a rather extravagant venture. But after 38 years of a very active and strenuous career her hull and engines were as good as new. The modification took seven months, and *Hibernia* returned to service on the Thames in 1923. More attention had been paid to efficiency than to general appearance, for in comparison with her former self she was now very ugly. But she still inspired deep affection and respect.

Right up to the end of her days, she worked hard and not without event. Her log records salvage work and fire-fighting, and she was a member of that heroic fleet which went to Dunkirk.

I have tried briefly to recall some of the events in *Hibernia's* life. Doubtless there are many more, and those who gathered at Gravesend to wave their last farewell had their own thoughts and memories. There will also be others outside our shores who will learn of *Hibernia's* last journey with regret.

Her crew will continue to work in other tugs of the Watkins fleet, but her Master, Bertie Youseman, will now enjoy his retirement. He was presented with her ship's bell as a reminder of the many hours that he had spent aboard her. ▣

CANBERRA COMPETITION

ENTRY FORM

Name..

....

Address..

....

....

Date of birth if entered in classes A or B.........

....

Class entered..

Scale of model...

Length of model in inches ....

State here if any parts of the model were purchased, and if so, what they were:

....

....

....

....

If the model was produced in collaboration with other modeller(s), give details:

....

....

....

....

Details of equipment and tools used:

....

....

....

....

Please give the names of two local or provincial newspapers in your locality:

....

....

I certify that the model is my own work, other than as stated above, and that I will abide by the conditions.

Signed...

Date..

Send this form to Model Engineer, 19-20 Noel Street, London W1. Details of where the model is to be sent will be sent direct to competitors.

CLOSING DATE FOR ENTRY FORMS: 30 June 1961.

Models to be completed by 31 July 1961

CLUB NEWS

Send news and notices to The CLUBMAN, 19-20 Noel Street, London W1.

ST ALBANS EVENTS

MORE than fifty competitors attended the first of this year's St Albans MES regattas. An 11 a.m. start enabled the five events to be arranged better than in previous years.

The steering competition ended with a win for the home team when Mr L. Curtis scored 9 points. Victoria MPBC took second place with Mr Proctor Jun. scoring 8 points, and Watford MPBC took third when 8 points were scored by Mr Disney.

In the nomination event Victoria MPBC snapped up first and second in the nomination event; Mr Proctor Senior and Mr Morse completed the course easily within their nominated times. The home team took third place with Mr Miller.

Mr Mapplebeck brought the St Albans team in first in the towing event when he completed the course with a remarkable 0.2 seconds error. The second place was also taken by the home team, Mr D. Saunders finishing the course with an error of 1.1 sec. The third place went to Mr Pritchard of North London SMEE. He scored 1.5 secs error.

The younger Proctor and Saunders were outright winners in the team race, completing the course in 0.3 secs error and chalking up another win for the St Albans club. Victoria won the team relay.

STILL MORE

Half-way through the traction engine season I am still hearing of more rallies. On July 8 a small meet is being held at Fyfield in connection with this year's Fyfield Carnival. The village is in West Essex, three miles to the North East of Chipping Ongar. Further details may be had from Mr L. E. Swaine, Spring Cottage, Fyfield, Ongar, Essex.

Later in the year, on September 9, the village of Ickleton will be full of activity. This small Cambridgeshire village is five miles south-west of Linton. You don't know where Linton is? Ten and a half miles to the south-east of Cambridge.

NORTH LINDSEYMAN

On Sunday July 23 the Railway Enthusiasts Club is running a special train, the North Lindseyman, over the North Lincolnshire lines. The train will start from Doncaster at 10.50 a.m. and its route will lie via Potter's Carr Junction, Low Ellers Junction and Kirk Sandall Junction, enabling it to traverse the Keadby and Gunhouse Wharf branches.

It will run up the North Lindsey Light Railway over the section that is still open and continue via Barnetby and the Grimsby Dock lines to the old passenger station at Grimsby Pier. The route then lies via Grimsby Town and the old Grimsby District Light Railway, which runs beside the Grimsby and Immingham, to cover the Immingham Dock branch.

When the trip over this branch is completed, the train will return to Doncaster via Goxhill, Barton-on-Humber, Immingham West Junction and Stainforth. It arrives back at Doncaster at 6.10 p.m.

Connections will be made for passengers coming from Manchester, Sheffield or Leeds, and for London passengers there are excursion facilities. Refreshments will be provided.

The inclusive fare is 34s. Readers wishing to attend the trip should write to Mr A. P. Miall, who lives at "Hurstbourne," Wainsford Road, Everton, Lymington, Hants. Do not forget a stamped addressed envelope, please.

RALLY ROUND

July 1-2 Alton Towers Rally. *Rally at Alton Towers, 8 miles NW of Uttoxeter, Staffordshire. Organised by the North Staffs Traction Engine Club.*
July 8 Fyfield Rally. *Rally at the village of Fyfield, Essex. The village is three miles north-east of Chipping Ongar.*
July 15-16 Rempstone Rally. *Rally at Rempstone, 30 miles NE of Loughborough.*
July 22 Redruth Rally. *Redruth is 9 miles SW of Truro, Cornwall.*
July 29 Kegworth Rally. *Rally at Kegworth, 5½ miles NW of Loughborough.*
July 29 Taunton Rally. *Rally at the County town of Somerset, Taunton, 44½ miles SW of Bristol.*
August 5-7 Woburn Rally. *Rally at the home of the Duke Bedford, Woburn Abbey.*
August 7 Church Stretton Rally. *Traction engine rally at Church Stretton, which is 12½ miles SW of Shrewsbury. Rally starts at 11 a.m.*
August 19 Weald of Kent Rally. *Rally organised by the Weald of Kent Traction Engine Club at Penshurst Aerodrome near Tonbridge, Kent.*
September 9 Kelvedon Rally. *Site is a mile along the main A12 from Kelvedon. Eastern National Omnibus Company buses pass the site.*
September 9 Ickleton Rally. *Rally at Ickleton village, five miles SW of Linton. Linton is 10½ miles SE of Cambridge.*
September 10 Basildon Rally. *Rally at the premises of Messrs Harold Wood at Basildonl Essex. Organised by the Historic Commercial Vehicle Club.*

CLUB DIARY

Dates must be sent at least four weeks before the event

July 1 Colchester SMEE. Meeting at the Castle Park, Colchester.
July 1-2 City of Leeds SME. Open day at Temple Newsam.
July 1 York City MES. Co-operative Society Gala. Portable track in action.
July 1 Leicester SME. Track day at Abbey Park.
July 1 Cambridge MES. Public track day at **Fulbrooke Road, Cambridge.**
July 1 Hitchin MES. Visit to Cambridge MES track.
July 1 Cambridge MES. Hitchin MES visit, Fulbrooke Road.
July 1 Historic Commercial Vehicle Club. Exhibition by Dagenham Motor Club entitled 50 years of the Ford Motor Corporation.
July 1 Cambridge MES. Open day at the track, Fulbrooke Road.
July 1 Bristol SMEE. Meeting at the Games Room of the YWCA.
July 1 North London SMEE. Standard Telephones Fete.
July 2 Birmingham SME. Annual outing to Stapleford Park near Melton Mowbray. Leave Civic Centre 10.30 a.m. Lunch at Nottingham.
July 2 MPBA. Regatta at Verulamium Lake, St Albans. SR and RC.
July 2 Norwich and District SME. Track meet at Eaton Park.
July 2 Malden SME. Track day at Claygate Lane.
July 4 City of Leeds SME. General meeting at Salem Chapel.
July 5 Birmingham SME. Meeting at the White Swan, Edmund Street, at 7.30 p.m.
July 5 Blackpool SME. Meeting at Marton Working Men's Club, at 7.30 p.m.
July 5 Watford MES. Talk on locomotive steam brakes, by Mr Cottham.
July 7 Rochdale SMEE. General meeting at Lea Hall, Smith Street, Rochdale.
July 8 Grimsby SMEE. Regatta at 2.15 p.m.
July 8 Lincoln SMEE. Track day at Boultham Park.
July 8 Bristol SMEE. Running day at Carford Park.
July 9 North London SMEE. The SMEE visit Arkley.
July 9 MPBA. Regatta at Wicksteed Park, Wicksteed. SR and SP.
July 9 MPBA Regatta at Whitehall Recreation, Bromley. SR and RC.
July 9 York City MES. City of Leeds SMEE visit to Rechabite Buildings, Clifford Street.
July 9 City of Leeds SME. Private running day at Temple Newsam.
July 9 Maidstone MES. Track day at Mote Park.
July 10 Sutton Coldfield MES. Book auction at The Swan, High Street, Erdington.
July 10 Leicester SME. Model night at Abbey Park.
July 12 Blackpool SME. Meeting at Marton Working Men's Club at 7.30 p.m.
July 14 Lincoln SMEE. Visit to Mr W. Spatt's "O" gauge layout at Ash near Sandwich, Kent. Meet at the clubroom at 7 p.m.
July 15-16 City of Leeds SME. Track meeting at Temple Newsam.
July 15 Bristol SMEE. Meeting at the Games Room of the YWCA.
July 16 MPBA. Regatta at Coventry for RC, SR and SP.
July 16 MPBA. Hydroplane regatta at Duncambs Breeches, Woburn Abbey at 12.30 p.m.
July 16 York City MES. Regatta in the morning at Rowntrees Park.

TEN DAYS in AUGUST

VULCAN leaves his usual haunts to write a page about the Model Engineer Exhibition

THE Model Engineer Exhibition, now back in the popular summer months but not yet back to its old venue, will open its doors at the Central Hall, Westminster, on the morning of August 16.

For the following ten days, with the exception of the intervening Sunday, the finest collection of models to be assembled annually under one roof will be on show.

The nation's newsgatherers recognise this fact and descend on us each year with snaking television cables, blinding floodlights, clicking cameras and pencils at the ready. We are, of course, very pleased to welcome them.

It may astonish you to know that a remarkably high proportion of the reporters are from foreign agencies or newspapers and periodicals overseas. (*Maybe it was one of them who got that picture of Lord Northesk into a woman's paper in New Zealand.*—EDITOR.)

At the time of writing it is not possible to forecast which competition section at the Exhibition will be best represented, as the bulk of entries has yet to arrive.

But at this early stage there have already been five entries for the Duke of Edinburgh Challenge Trophy which, as many readers will already know, is the premier award. The trophy is presented annually and is restricted to any piece of model engineering which won a Championship Cup, Gold or Silver medal or one of the cups donated by the Friends of the Exhibition. It is, in short, the award of awards.

An event of importance at the 1961 show will be the judging of the entries in the *Canberra* competition. Though not a great deal of time was allowed for completion of the models—many modellers like to pursue their hobby in a leisurely fashion—there was an excellent response.

The P & O Lines, which own the *Canberra*, and with whose co-operation the competition was organised, are awarding the three handsome silver cups, one for each section. They will also have their own large model of the *Canberra* on show.

Another maritime model of considerable proportions will be Mr D. G. Ashton's 15 ft miniature working submarine. The constructor has already spent several years on this elaborate project and it is still not complete. It promises to be one of the most remarkable models for many a day, and it is generous of Mr Ashton to give model engineers the opportunity to inspect it in its incomplete form.

It is always our hope that overseas readers will not only find time to visit the Exhibition—as many do—but will submit entries of their work in the competition sections. Unfortunately, packaging, time in transit, freight charges and (until recently) Customs problems have raised too many difficulties for us to expect a surge of entries.

However, Mr A. C Craft, of Santa Ana, California, is working diligently on a rotary valve, double-acting steam engine of his own design which he hopes to despatch in time for the Exhibition. This is a commendable achievement, for Mr Craft is seriously handicapped, having the use of only three fingers of his left hand. We all hope that his model will be finished in time to be put on show.

One of the delights to the model engineer is the joy of seeing and examining so many first class models. Here he gets ideas for future projects and sees how others solved those awkward problems which, though inseparable from the hobby, are nevertheless one of the challenging features that make model engineering a fascinating and rewarding pastime.

He has an opportunity, too, to see some of the machines and tools on the market—the customary trade stands will be there this year—and to witness demonstrations of up-to-date equipment. Craftsmen, long acknowledged experts in their respective fields, will also be on hand to show how they tackle some of the details.

The tremendous advantage of the personal demonstration is that experts describe the operations as they proceed and are ready to enlighten those who have not grasped the essentials.

Admission to the Model Engineer Exhibition will be 2s. 6d. (children 1s. 6d.) but considerable reduction may be had by travelling in parties of 12 or over, when the 2s. 6d. ticket is reduced to 1s. 9d. and the children's to 1s. Details of this scheme may be had from the Exhibition Manager.

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Mr George Slack with the steam roundabouts which will be at the Exhibition

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